Property of
The Illinois State
Dental Society.

THE

ANNUAL JOURNAL

OF THE

ILLINOIS

STATE DENTAL SOCIETY.

TRANSACTIONS FOR THE YEAR 1881.

"ARTEM DOCTRINA SANITATEM ARTE."

Digitized by the Internet Archive
in 2011 with funding from
University of Toronto

http://www.archive.org/details/transactionsofi17illi

INDEX TO TRANSACTIONS.

PAGE

Address of Welcome 7
Amendments to Constitution 15
Annual Address, President Appointed to Deliver 22
Application for Scholarship at Baltimore Dental College 14
Appropriation for Legislative Committee 18, 19
Characteristics of Saliva in Syphilitic Persons, by Dr. A. W. Harlan . 162
Communication from Dr. R. Finley Hunt, Secretary of Dental Association of U. S. A. 19
Delegates to Medical Congress 22
Delegates to American Dental Association 22
Dental Hygiene, by Dr. W. P. Richards 51
Development of the Enamel, by Dr. M. S. Dean 107
Disclaimer 170
Discussions,
Dr. Autes 50
Dr. Barker 64
Dr. Black 41, 44, 45, 56, 65, 104, 106, 110, 112, 123, 124, 133, 152, 153, 154, 168, 169
Dr. Brophy 44, 64, 106, 112, 125, 134, 154, 155, 168, 169
Dr. Cormany 45
Dr. Creswell 60
Dr. Cushing 44, 124
Dr. Davis 151, 152
Dr. Dean 43, 110, 111
Dr. Dorn 125
Dr. Freeman 60
Dr. French 155
Dr. Gilmer 45
Dr. Harlan 60, 125, 152
Dr Hanaford 152
Dr. Morrison 43, 47, 106, 155
Dr. Noyes 151
Dr. Kitchen 47
Dr. Kulp 57
Dr. Richards 168
Dr. Sitherwood 59, 66
Dr. Spalding 63, 123, 124, 125, 127, 131, 136, 168, 169
Dr. Sudduth 45
Dr. Swain 50, 67, 167, 168
Dr. Taft 61, 125, 135
Dr. Taylor 59, 66, 110, 111, 151, 152
Dr. Templeton 58, 124, 125, 153, 154
Dr. Talbot 46, 123, 125, 150, 152
Dr. Townsend 43, 150, 151

PAGE.

Election of Officers 20
Election of Members 9
Election of Corresponding Members 10, 15
Fillings, by Dr. J. M Hurtt 144
Fractures of the Inferior Maxilla. by Thomas L. Gilmer 67
Greetings to Iowa State Dental Society 14
Invitation from Iowa State Dental Society 16
Instructions to Publication Committee 22
Instructions to Secretary 22
Members, List of 8
Officers, 1881-1882 5
Operative Dentistry, by Dr. George S. Miles 137
President's Address 23
Place of Next Meeting, Selection of 20
Payment of Bills and Secretary's Salary 21
Past, Present and Future of Mechanical Dentistry, by Dr. L P. Haskell . 48
Report of Publication Committee 10
" Legislative Committee 11
" Committee on Code of Ethics 13
" Secretary 13
" Treasurer 14
" Executive Committee 10, 22
Response to Address of Welcome, by Dr. Black 8
Resolution Respecting Honorary Members 15
Resolution Inviting Physicians and Dentists to take part in Discussions . 15
Resolution Appointing Committee on Directory of Dentists . . . 16
Resolution Respecting Medical Education of Dentists 19
Request to Iowa Society for Dr. Ingersoll's Paper 17
Resignation of Dr. Cushing from Legislative Committee 21
Standing Committees, 1881-1882 6
Successful Practice of Dentistry in the Future, by Dr. C. A. Kitchen . 127
Stereopticon Exhibition by Dr. Eames 18
Suggestions Relative to the Cause of Rapid Dental Decay, by Dr. C. W. Spalding 155
The Chemistry and Pysiologic al Action of Mercury, as Used in Amalgam Fillings, by E. S. Talbot 112
Treatment of Teeth with Dead or Dying Pulps, by Dr. H. H. Townsend . 28
Vote of Thanks to S. R. Bingham 21
" " James Clayton 21
" " Chicago Refining Co. 21
" " Executive Committee 21
" " Dr Haskell 16, 50
" " Hotels of Rock Island 21
" " Mayor and Council of Rock Island 21
" " Press of the City of Rock Island 21
" " Ransom & Randolph 21
" " Trustees of S. S. White 21
" " Dr. Cushing 21
" " Rodman Rifle Company 21
" " Railroads 21

The Illinois State Dental Society.

ORGANIZED, JULY 24, 1865.

OFFICERS, 1881-82:

PRESIDENT,

A. W. HARLAN, - - - - Chicago

VICE-PRESIDENT,

W. T. MAGILL, - - - - Rock Island

SECRETARY,

EDMUND NOYES, - - - - Chicago

TREASURER,

E. C. STONE, - - - - - Galesburg

LIBRARIAN,

H. H. TOWNSEND, - - - - Pontiac

OFFICERS, 1880-81:

PRESIDENT,

J. FRANK MARRINER, - - - Ottawa

VICE-PRESIDENT,

J. A. W. DAVIS, - - - - Galesburg

SECRETARY,

EDMUND NOYES, - - - - Chicago

TREASURER,

E. C. STONE, - - - - Galesburg

LIBRARIAN,

G. H. HARRINGTON, - - - Delavan

The next annual meeting will be held at Quincy on the second Tuesday in May 1882.

STANDING COMMITTEES, 1881-82.

EXECUTIVE COMMITTEE.

E. S. TALBOT (Chairman), - - - CHICAGO
S. M. STURGISS, - - - - - QUINCY
J. M. DOWNING, - - - - MACOMB

BOARD OF EXAMINERS.

M. S. DEAN (elected in 1879), - - - CHICAGO
G. V. BLACK (elected in 1880), - - JACKSONVILLE
K. B. DAVIS (elected in 1881), - - - SPRINGFIELD

PUBLICATION COMMITTEE:

E. NOYES, - - - - - CHICAGO
E. D. SWAIN, - - - - - CHICAGO

COMMITTEE ON LEGISLATION:

K. B. DAVIS, - - - - SPRINGFIELD
G. S. MILES, - - - - - JERSEYVILLE
E. D. SWAIN, - - - - - CHICAGO
A. W. HARLAN, - - - - CHICAGO
T. W. BROPHY, - - - - - CHICAGO

COMMITTEE ON INFRACTIONS OF THE CODE OF ETHICS:

FRANK H. GARDINER, - - - CHICAGO
W. B. WOODWARD, - - - - PEORIA
G. D. SITHERWOOD, - - - - BLOOMINGTON

MINUTES OF TRANSACTIONS

OF THE

Seventeenth Annual Meeting.

By EDMUND NOYES, Secretary.

The Seventeenth Annual Meeting of the Illinois State Dental Society was held at Rock Island, on Tuesday, May 10th, 1881, and was called to order at 10 o'clock A. M. by the President, Dr. J. Frank Marriner, of Ottawa, and the Rev. J. S. McCord, M. D., of Rock Island, opened the meeting with prayer.

The published minutes of the last meeting were accepted without reading, and the roll of members was called.

The Society was welcomed to the city by Mr. J. J. Parkes, at the request of the Mayor, who was detained by sickness. He spoke substantially as follows:

Gentlemen: I have been requested by the Mayor of Rock Island, to meet you here this morning, to bid you welcome to our city.

I felt some reluctance about doing so, for you have the reputation of being men whom people rather dislike to encounter, but I am aware that you are rather more workers than talkers, and, though I have had no experience in your hands myself, from what I have heard my friends say about you, I would rather meet you collectively than singly.

We are glad to welcome any who may choose our city as a place for meeting together, but we are especially glad to welcome you, whose meeting is to promote the usefulness and success of a profession that does so much for the comfort and health and beauty of those dependent upon you for assistance.

In behalf of the city and its Common Council, we welcome you and give you the use of this room, and in behalf of the Rodman Rifle Company we offer you the use of their drill room, and all the furniture and conveniences that may be found in this building, as you may require, and we bid you welcome to our city, and to the good will and hospitality of our citizens.

On motion of Dr. Brophy, Dr. Black, of Jacksonville, was called upon to reply for the Society. He said:

It is hardly fair to be jumped out in such a way, without warning, or the opportunity for preparation. It is a great pleasure to meet here. We have met here before, and if we had not been pleased with the city, with its citizens, and with the hospitality that we received, we should not have come here again. I can say to you that the place is at one side of the State, and many of us come long distances to get here, and are willing to do so, because we like to meet here.

We thank you, and your city, and your Board of Aldermen, and your military company, for the welcome you have given us.

The roll of active members is as follows, those in italics having been present at the meeting, and those marked with an asterisk (*) having sent dues:

Antes, R. H., Geneseo.
Black, G. V., Jacksonville,
Brophy, T. W., Chicago.
*Baldwin, C. V., Danville,
Baker, D. B., Quincy.
Cushing, G. H., Chicago.
*Crouse, J. N., Chicago.
*Campbell, J., Bloomington.
Call, E. B., Peoria.
Clark, A. B., Chicago.
Carpenter, G. T., Chicago.
Creswell, J. J., Galena.
Cormany, J. W., Mt. Carroll.
Dean, M. S., Chicago.
Davis, K. B., Springfield.
Hyde, J. H., Lewiston.
Kitchen, C. A., Rockford.
Kingsley, G. P., Freeport.
Koch, C. R. E., Chicago.
Krape, W. W., Freeport.
Lionberger, J. M., Dallas City.
Lawrence, R. Neal, Lincoln.
McCoy, T. H., Pana.
Matteson, A. E., Chicago.
*Miles, G. S., Jerseyville.
Magill, W. T., Rock Island.
Mills, W. H., Freeport.
Marriner, J. Frank, Ottawa.
Murphy, J. D., Bushnell.
Matteson, C. F., Chicago.

Dean, W. W., Lacon.
*Davis, E. F., Galesburg.
Davis, J. A. W., Galesburg.
David, E. B., Aledo.
Downing, J. M., Macomb.
Duncan, E., Jacksonville.
Dwight, C. R., Danville.
Dorn, C. P., Naperville.
Freeman, A. W., Chicago.
*Freeman, D. B., Chicago.
*Fisher, J. W., Bloomington.
Gardiner, Frank H., Chicago.
Green, E. J., Peoria.
Gibbs, A. E., Ottawa.
Gilmer, T. L., Quincy.
Gill, Henry C., Rockford.
Henry, Charles, Jacksonville.
Harrington, G. H., Delavan.
Hand, M. F., Joliet.
Hobert, E. S., Ottawa.
Harrison, B. T., Gibson City.
Hurtt, J. M., Peoria.
Harlan, A. W., Chicago.
Honsinger, E., Chicago.
Hanaford, M. L., Rockford.
*Howard, G. O., Chicago.
Noyes, Edmund, Chicago.
*Newkirk, Garrett, Wenona.
Ormsbee, W. W., Geneva.
*Patten, M. H., Springfield.
Pruyne, C. P., Chicago.
Prichett, T. W., White Hall.
Pollock, D. J., Sterling.
Rohland, C. B., Alton.
Richards, W. P., Elgin.
Stevens, W. A., Chicago.
Smith, Joshua, Chicago.
Swain, E. D., Chicago.
Stephens, J. W., Dixon.
Sturgiss, S. M., Quincy.
Stone, E. C., Galesburg.
Schadle, A. C., Warren.
Salter, G. B., Joliet.
Stewart, E. H., Joliet.
Sitherwood, G. D., Bloomington.
Talbot, E. S., Chicago.
Townsend, H. H., Pontiac.
Taggart, W. H., Freeport.
Taylor, C. R., Streator.
Waltz, A. S., Decatur.
Widenham, J. C., Jacksonville.
Woodward, W. B., Peoria.

During the four days of the meeting, the following named new members were elected and qualified, each of them having been recommended by the Board of Examiners:

T. W. Beckwith, of Sterling.
Geo. A. Christman, of Chicago.
S. F. Duncan, of Wilmington.
J. H. Kennicott, of Chicago.
W. C. Martin, of Peoria.
Louis Ottofy, of Lebanon.
John J. R. Patrick, of Belleville.
J. W. Peck, of Canton.
C. W. Stutenroth, of Walnut.
Will. X. Sudduth, of Bloomington.
O. H. Smith, of Sycamore.
S. H. Verbeck, of Lena.
Thos. G. Wonderly, of Galena.

The following is a list of the corresponding and honorary members, with their residences as far as known to the Secretary:

G. W. Keeley, Oxford, Ohio.
Homer Judd, Webster City, Iowa.
W. H. Eames, St. Louis, Mo.
Edgar Park, St. Louis, Mo.
Isaiah Forbes, St. Louis, Mo.
H. J. McKellops, St. Louis, Mo.
R. J. Poore, ———— —.
C. C. Chittenden, Madison, Wis.
S. L. Judd, Beloit, Wis.
R. S. Rathbun, Clinton, Iowa.
L. C. Ingersoll, Keokuk, Iowa.
J. Taft, Cincinnati, O.
C. R. Butler, Cleveland, O.
H. N. Lewis, Quincy, Ill.

H. S. Chase, St. Louis, Mo.
F. A. Brewer.
W. N. Morrison, St. Louis, Mo.
W. O. Kulp, Davenport, Iowa.
I. P. Wilson, Burlington, Iowa.
C. S. Smith, Lancaster, Wis.
J. Hardtner, Springfield, Ills.
C. W. Spalding, St. Louis. Mo.
A. H. Fuller, St. Louis, Mo.

The following named gentlemen were elected corresponding members of the Society at this meeting:

Dr. W. C. Barrett, Buffalo, N. Y.
Dr. Geo. A. Bronson, St. Louis, Mo.
Dr. J. G. Templeton, Pittsburgh, Pa.
Dr. D. Gale French, Pittsburgh, Pa.
Dr. D. C. Hawxhurst, Battle Creek, Mich.

REPORTS OF COMMITTEES.

The Executive Committee reported by its chairman, Dr. Brophy, presenting the printed programmes already distributed, as the order of business for the sessions. He said that an effort had been made to have places upon the programme filled by men from as many different parts of the State as possible.

We are disappointed at the absence of a number who had promised to be here. Dr. Haskell, of Chicago, is sick, but has sent his paper, which will be read. Dr. Antes, of Geneseo, has consented to arrange the implements, etc., for a model dental laboratory, instead of Dr. Haskell. Dr. D. B. Freeman, of Chicago, and W. W. Dean, of Lacon, are both detained by sickness in their families, and their places in the clinics will have to be supplied by others. It has been impossible to find the patients to furnish a case for transplanting for Dr. Morrison, but he will perform an operation of replanting.

On motion of Dr. Dean the Society adopted the printed programme as the order of business.

REPORT OF PUBLICATION COMMITTEE.

Mr. President and Gentlemen of the Illinois State Dental Society:

In compliance with your instructions, three hundred and fifty copies of the transactions have been published and distributed. None have been sent to dentists in this State who are not members of the Society. The expense of publication was diminished one-half by having the work done by the *Missouri Dental Journal*,

with the privilege of using the matter for publication in the *Journal*.

The bills are as follows:

To printing 350 copies, as per bill of Missouri Dental Journal, . . .	$75 50
To postage and incidentals, ...	14 50
Total, ...	$90 00

Your committee recommend that an edition of four hundred copies be printed this year, believing that to be about the number required to carry out fully, the same general plan of distribution as has been pursued the past two years.

Respectfully submitted,

E. NOYES,
E. D. SWAIN, } *Committee*

The report was accepted and adopted.

REPORT OF COMMITTEE ON LEGISLATION.

Dr. Cushing, the chairman, read the following report:

Your committee would respectfully report that the bill relating to the practice of dentistry was duly introduced into both houses of the Legislature, was defeated on its final passage in the House, but finally carried through the Senate.

The bill, as introduced, was substantially like the old bill, and, as amended and finally passed by the Senate, was only changed by taking all power out of the hands of this Society, thus making it practically a State Board, an objection urged against the bill by members of the Legislature; but one really of their own creation.

The bill, as passed by the Senate, is now before the House, and has been ordered to a second reading, which will probably be reached about the last of next week.

Your committee have pursued the same course as in former years, soliciting by personal correspondence, the coöperation of members of the profession throughout the State, both members of this Society and those outside of the same.

In pursuance of these duties, they have written something more than three hundred personal letters, a large part of which have received prompt and favorable responses.

Your committee desire to state particularly what special aid has been rendered by special parties. The Chicago Dental Society appropriated one hundred dollars to assist in the prosecution of the work assigned to your committee. They also appointed a committee of three to act in coöperation with the committee from this Society. The committee of the Chicago Society, consisting of Drs. A. W. Harlan (chairman), T. W. Brophy and E. S. Talbot, in pursuance of its plans to aid the work, expended not only the whole amount appropriated by the Chicago Society, but as much more individually. They prevailed upon Dr. Allport to go to Springfield, and work for the passage of the bill, and they have personally been in attendance there, and have undoubtedly aided materially in advancing the interests of the bill. It is proper for the committee to acknowledge here the indebtedness of the profession to one who does not claim even the name of dentist, though practicing a special branch of dentistry. I refer to Mr. Richmond, the manufacturer of the Richmond Crowns.

Mr. Richmond succeeded, by persistent personal effort, in interesting the Hon. Senator Evans in the subject, who thereupon devoted himself to the interests of the bill, and secured, as he told me, the votes of eight senators who were previously opposed to the bill. Senator Evans also used his influence with members of the House, and undoubtedly with some success.

After the defeat of the bill in the House, your committee secured a list of those who voted against it, and opened a correspondence with members of the profession located at the places of residence of such, to urge special efforts to secure from those opposing members a reconsideration of their action. Through the kindness of Mr. S. R. Bingham, the names of dentists were obtained who were not known to your committee. The results of this correspondence have brought promises sufficient to guarantee the success of the bill, if they shall be fulfilled.

Your committee feel hopeful that if the bill again comes up, it may pass.

Your committee beg to state that while they consider the amendments made to the bill in the Senate unwise, they do not consider them of vital importance, feeling confident that any bill

will be better than no bill, and that it may easily be amended hereafter.

G. H. CUSHING, } *For the Committee.*
K. B. DAVIS, }

On motion of Dr. Dean the report was received and adopted, and the committee continued.

COMMITTEE ON INFRACTIONS OF THE CODE OF ETHICS.

Dr. Harlan reported that the chairman of the committee was absent, and that he had no knowledge of any cases having come before the committee.

REPORTS OF OFFICERS.

SECRETARY'S REPORT.

The Secretary read his report, as follows:

The number of active members in good standing at the date of the last report was		79
The number of new members received in May, 1880, was		5
Total,		84
There have been lost, by removal from the State, Dr. W. W. Woodburn, of Dixon,	1	
By non-payment of dues, Dr. G. H. Hoadley, of Byron,	1	
	—	2
Leaving a membership at this time of		82

The receipts for dues and initiations were three hundred and thirteen dollars ($313.00), for which amount the treasurer's receipts are herewith submitted.

Delinquent notices have been sent twice during the year to all who were in arrears for dues, and care has been taken to inform those who were in danger of being dropped for non-payment of dues, at what time their membership would cease.

The Society requested the Secretary to rearrange the list of corresponding and honorary members under their respective titles. He has found it rather difficult to decide as to which class some of the names belong. The Secretary is of the opinion that there is but little motive for any attempt to separate the two classes (corresponding and honorary members), but they

might as well remain as at present, in one list. There is no means of knowing which term was used when they were individually elected, and practically it would seem to be of but little consequence.

Respectfully submitted,

EDMUND NOYES, *Secretary.*

Dr. Cushing moved that the report be accepted and adopted, and the list of corresponding and honorary members be allowed to remain as it is. Carried.

The accounts of the Secretary were referred to the Executive Committee for auditing.

TREASURER'S REPORT.

The report of the Treasurer, Dr. E. C. Stone, of Galesburg, which was read at the afternoon session, showed receipts and expenditures as follows:

Balance in Treasury at last report, . . .	$137 23	
Received from the Secretary.	313 00	
		$450 23
Expenditures as per vouchers, ...	$193 40	
Cash on hand, ...	256 83	
		$450 23

The report was received and referred to the Executive Committee for auditing.

The Executive Committee afterward reported the accounts of the Secretary and Treasurer correct, and their report was adopted by the Society.

Dr. Dean moved that a committee be sent to the Iowa State Dental Society, now in session at Davenport, with fraternal greetings from this Society, and an invitation to be present at any of our meetings or clinics, as they may find convenient. The motion prevailed, and Drs. M. S. Dean and C. F. Matteson were appointed the committee.

Dr. Cushing presented the application of Mr. N. J. Roberts, of Waukegan, asking this Society to recommend him for the beneficiary course at the Baltimore Dental College, he having attended one course of lectures, and not being able to attend the second without that assistance. After saying that he had taken pains to make inquiries, and had learned from Waukegan that

Mr. Roberts is a worthy gentleman, and from Dr. Gorgas, one of the professors in the Baltimore College, that he is a promising student, Dr. Cushing moved that the Society grant him the desired recommendation. The motion prevailed.

Dr. W. A. Stevens moved the following resolution, which was adopted:

"*Resolved*, That if any honorary or corresponding member of this Society shall remove into this State, and enter upon the practice of dentistry, such honorary or corresponding membership shall cease."

The Society adopted the amendment to article second of the Constitution, which was proposed at the last annual meeting by Dr. Hurtt and others.

The amendment adds to article second the words, "And in no case shall a general ballot be dispensed with," and article second as amended reads as follows:

"The officers of the Society shall consist of a President, Vice President, Secretary, Treasurer, Librarian, Executive Committee (of three), and a board of three examiners, and such other officers as may be designated by the By-Laws, which officers shall be chosen annually by ballot, *and in no case shall a general ballot be dispensed with.*"

The purpose of this amendment is to prevent the Society from appointing the Secretary or President, by unanimous consent, to cast the vote of the Society.

The Society also adopted the amendment to the Constitution and By-Laws proposed at the last annual meeting by Dr. Dean and others, by substituting the words "Examiner and Examiners," instead of "Censor and Censors," wherever they occur in the Constitution and By-Laws.

Upon the nomination of Dr. Brophy, the Society elected W. C. Barrett, M. D., D. D. S., of Buffalo, N. Y., to be a corresponding member of this Society.

Dr. Brophy moved, That physicians of this and other States, and dentists of other States, who may be present at any time during the meeting, are invited to take part in the discussions of this Society. Carried.

Dr. A. W. Harlan, the member for the State of Illinois, of

the American Dental Association's Committee on a Directory of Dentists of the United States, moved, That this Society appoint a committee of three, whose duty it shall be to coöperate with the committee of the American Association in the endeavor to make an accurate list of the practitioners of dentistry in the State of Illinois. Carried, and the President appointed Drs. E. S. Talbot, of Chicago, J. M. Hurtt, of Peoria, and T. L. Gilmer, of Quincy.

The Society adjourned till 2:30 P. M.

AFTERNOON SESSION.

The Society was called to order by the President at 2:30 P. M.

The minutes of the morning session were read and approved.

The Treasurer, Dr. E. C. Stone, of Galesburg, read his report, and it was referred, together with that of the Secretary, to the Executive Committee for auditing.

The Vice-President, Dr. J. A. W. Davis, of Galesburg, occupied the chair, and the President read his annual address.

On motion of Dr. Dean the discussion of the President's address was postponed till after the reading of Dr. Kitchen's paper, and the Society proceeded to the subject next in order.

Dr. H. H. Townsend, of Pontiac, read his essay, entitled, "Treatment of Teeth containing Dead and Dying Pulps, also, Treatment of Alveolar Abscess."

The subject was discussed by Drs. Black, Townsend, Dean, Morrison, Brophy, Cushing, Sudduth, Cormany, Gilmer and Talbot.

The subject was passed and the next in order taken up.

Dr. L. P. Haskell, of Chicago, being detained at home by sickness, the Secretary read his paper, entitled, "Mechanical Dentistry; Its Past, Present and Future."

On motion of Dr. Brophy, a vote of thanks was passed to Dr. Haskell for his excellent paper.

The subject of Mechanical Dentistry was passed.

Dr. Brophy, for the Executive Committee, presented the invitation of the Iowa State Dental Society, to attend this evening's session of their meeting in Davenport.

Dr. Cushing moved that the Society accept the invitation, and that we cross the river at 7:30 P. M. Carried.

The Society adjourned till 2:30 p. m., of Wednesday, May 11th, there being no evening session, and the forenoon of Wednesday having been set apart for clinics.

SECOND DAY—Afternoon Session.

The Society was called to order by the President at half-past two o'clock.

The minutes of last evening's session were read and approved.

The roll of active members was called.

Dr. Brophy, for the Executive Committee, announced that the evening session would be occupied in the reading of Dr. Gilmer's paper, illustrated by means of numerous water-color drawings by Dr. Black, and afterward by an exhibition by Dr. Eames, by means of a stereopticon, of specimens, illustrating the development of the teeth, and some specimens of morbid anatomy.

Dr. Brophy, for Executive Committee, made announcement of the manner of obtaining certificates, by means of which a reduction of railroad fare may be obtained in going home.

Dr. W. P. Richards, of Elgin, read his paper, entitled "Dental Hygiene," and the subject was afterward discussed by Drs. Black, Kulp, Templeton, of Pittsburgh, Taylor, Sitherwood, Harlan, A. W. Freeman, Creswell, Taft, of Cincinnati, Spalding, of St. Louis, Brophy, W. H. Barker, of Pella, Iowa, and Swain.

The Society adjourned till 8 p. m.

EVENING SESSION.

The Society was called to order by the President at eight o'clock.

The minutes of the morning session were read and approved.

On motion of Dr. C. F. Matteson, the Society requested of the Iowa State Dental Society and Dr. L. C. Ingersoll, the privilege of publishing with our Transactions the paper read by Dr.

Ingersoll before that Society, entitled "Alveolar Ulceration distinguished from Abscess."

The Secretary received a reply from the Secretary of the Iowa Society stating that Dr. Ingersoll's paper had already been given for publication to the *Dental Register* and to the *Ohio State Journal of Dental Science.*

Dr. T. L. Gilmer, of Quincy, read his paper, entitled "Fractures of the Inferior Maxilla," illustrating the subject by means of a large number of water-color drawings, prepared by Dr. G. V. Black, of Jacksonville, who followed the reading of the paper by some further explanation of some of the drawings, and descriptions of several cases in his practice.

The remainder of the evening, till a very late hour, was occupied by Dr. W. H. Eames, of St. Louis, in a stereopticon exhibition of plates, illustrating the development of the teeth, and some examples of morbid anatomy; some of the pictures being explained by Dr. Dean, and the others by Dr. Eames.

The Society adjourned till 1:30 P. M. of Thursday, May 12th, the morning of Thursday being set apart for clinics.

THIRD DAY—AFTERNOON SESSION.

The Society was called to order at 2 o'clock by the President.

The minutes of last evening's session were read and approved.

Dr. Cushing, Chairman of the Committee on Legislation, said that it is possible that proper attention may procure the passage of the dental bill at this session of the Legislature, and moved that the Society appropriate one hundred dollars for the use of the legislative committee, so that some one can be sent to Springfield when the proper time comes.

Dr. Brophy seconded the motion, and said that it is essential that some one should be there at the time when the bill should come up.

Dr. Cushing said it is possible that some members of the Society do not understand the scope of the bill. It should be understood that it does not touch any member of the profession now in practice.

Dr. Gilmer thought the committee very modest in the amount asked for, and moved to amend by making the amount one hundred and fifty dollars. The amendment was accepted by the mover, and the amended motion was carried.

Dr. M. S. Dean, of Chicago, read his paper, entitled, "The Development of the Enamel," using a number of admirable drawings to illustrate the subject. The discussion following was by Drs. Taylor, Black and Dean.

Dr. E. S. Talbot, of Chicago, read his paper, entitled, "The Chemistry of Mercury, and Its Constitutional Effects resulting from the Use of Amalgam Fillings."

The subject was discussed by Drs. Spalding, Black, Talbot, Templeton, Cushing, Harlan, Brophy, Dorn and Taft.

Dr. Kitchen read his paper, entitled, "What must be the Preparation for the Successful Practice of Dentistry in the Future?" The discussion was postponed till evening.

A communication was read from Dr. R. Finlay Hunt, of Washington, D. C., the Secretary of the "Dental Association of the United States of America."

The Society adjourned till 8 P. M.

EVENING SESSION.

The Society was called to order by the President at 8 o'clock.

The minutes of the afternoon session were read and approved.

The subject of Dr. Kitchen's paper, and the President's address, was discussed by Drs. Spalding, Black, Brophy and Taft.

Dr. K. B. Davis, of Springfield, offered the following, which was adopted.

"WHEREAS, Dentistry is a specialty of the science of Medicine; and

"WHEREAS, A sound and thorough medical education is required of other specialists; therefore,

"*Resolved*, That we believe a medical education necessary to the most successful practice of Dentistry."

Dr. G. S. Miles, of Jerseyville, being absent, the Secretary read his paper on "Operative Dentistry." This was followed by the reading of a paper by Dr. J. M. Hurtt, of Peoria, entitled, "Filling."

Dr. Brophy, for the Executive Committee, announced that it would be desirable to meet at 8 o'clock to-morrow morning, and hold a continuous session till the final adjournment.

The Society adjourned till 8 A. M. of Friday, May 13th.

FOURTH DAY—Morning Session.

The Society was called to order by President Marriner at half-past eight o'clock.

The minutes of last evening's session were read and approved.

The discussion on operative dentistry was participated in by Drs. Townsend, Taylor, K. B. Davis, Hanaford, Harlan, Talbot, Black, Templeton, Spalding, Brophy, French and Morrison.

Dr. Dean offered the following resolution, which was adopted, "That we close the business of the meeting at this session, and when we adjourn, we adjourn *sine die*."

Dr. C. W. Spalding, of St. Louis, read his paper, entitled "Suggestions Relative to the Causes of Rapid Dental Decay."

Dr. A. W. Harlan, of Chicago, read his paper entitled "Characteristics of Saliva in Sypilitic Patients."

The subject of these papers was discussed by Drs. Swain, Brophy, Richards, Black and Spalding.

The Society proceeded to the selection of the next place of meeting, and the election of officers.

ELECTIONS.

Quincy was chosen as the place for holding the next annual meeting on the second Tuesday in May, 1882.

The election of officers resulted as follows:

President—A. W. Harlan, of Chicago.
Vice President—W. T. Magill, of Rock Island.
Secretary—Edmund Noyes, of Chicago.
Treasurer—E. C. Stone, of Galesburg.
Librarian—H. H. Townsend, of Pontiac.
Executive Committee—E. S. Talbot, chairman, of Chicago; S. M. Sturgiss, of Quincy; J. M. Downing, of Macomb.

The President nominated, and the Society elected, Dr. K. B. Davis, of Springfield, to be his own successor as a member of the Board of Examiners.

The newly elected President was installed and thanked the Society for the honor conferred upon him.

Dr. Brophy moved that the President and Dr. E. D. Swain, of Chicago, be added to the Committee on Legislation. Carried.

Dr. Cushing resigned as a member of the Committee on Legislation, and asked the Society to release him from further service on that committee.

The resignation was accepted, and on motion of Dr. Hurtt a vote of thanks was passed to Dr. Cushing for his long, faithful and laborious services as chairman of the Committee on Legislation.

The President appointed Dr. T. W. Brophy, of Chicago, to fill the vacancy in the Committee on Legislation.

The President appointed for the Committee on Infraction of the Code of Ethics, Drs. Frank H. Gardiner, of Chicago; W. B. Woodward, of Peoria, and G. D. Sitherwood, of Bloomington.

The Society ordered the Treasurer to pay all properly authenticated bills against the Society, and fifty dollars to the Secretary for his services.

A vote of thanks was passed to the Mayor and Common Council of Rock Island for the welcome given us and the use of the Council Chamber for our meeting; to the Rodman Rifle Company for the use of their drill-room, and the postponement of their regular drill, so that the Society might use the room on that evening, and for other courtesies shown to the Society.

A vote of thanks was passed to James Clayton, the janitor of the building in which the meeting was held.

A vote of thanks was passed to the press of the city of Rock Island.

Votes of thanks were also passed to Mr. S. R. Bingham and the trustees of the estate of Samuel S. White for the postage and mailing of the announcements of the meeting to all the dentists in this State, and many in the neighboring States, and for the use of chairs, etc., for the clinics. To Ransom & Randolph, of the Toledo Dental Depot, and the Chicago Refining Company, for use of chairs, books, materials, etc., for use in the clinics and for exhibition at the place of meeting.

Votes of thanks were passed also to the hotels of Rock Island and the railroads, which have given us reduced rates.

A vote of thanks was passed to the Executive Committee

for their care and labor in the preparations and arrangements for the meeting.

The Executive Committee reported that the accounts of the Treasurer and Secretary were correct. The report was adopted.

The Society voted to give the Publication Committee discretionary authority in regard to the number of copies of the Transactions to be printed, and in regard to the employment of a short-hand reporter for the next meeting.

On motion of Dr. Hurtt, the Secretary was requested to find one of the members of the Society to assist him by preparing the reports of our proceedings that are to be published in the newspapers.

Dr. Cushing referred to the fact that a Medical Congress is to be held in London next August, and there is a section on Dentistry connected with it, and moved that Dr. M. S. Dean, of Chicago (who expects to be in England at that time), be requested to represent this Society at that meeting, so far as the nature of the organization, and the circumstances, will admit of doing so.

After amendment so as to include any other members of the Society who may be able to go there at that time, the motion was carried.

The President and Secretary were instructed to furnish delegate certificates (within the number to which we are entitled) to any members of the Society who may wish to attend the meeting of the American Dental Association.

The President was appointed to deliver the next annual address.

The minutes of the present session were read and approved.

There being no further business, the Society adjourned, to meet at Quincy, on the second Tuesday in May, 1882.

EDMUND NOYES, *Secretary.*

ADRESSES, ESSAYS AND DISCUSSIONS.

ANNUAL ADDRESS,

BY THE PRESIDENT, DR. J. FRANK MARRINER, OF OTTAWA.

We have gathered to-day from the North, from the East, from the South, and as our Iowa brothers are in session just across the Mississippi, we hope to see not a few well-known faces from the West. We have met to revive memories dear to us, and by a free interchange of friendly congratulations bind and cement ourselves into a more perfect and intimate union, (not a trade union, however.) A custom long ago established, makes it incumbent on me at this time to present something for your consideration, and I assure you it is with many misgivings and great reluctance that I approach the task. My predecessor has given you so complete a history of dentistry, from the time it left the banks of the Nile up to its present exalted position of usefulness, that there appears nothing left for me to say upon that point. The history of this Society has been presented to you with equal accuracy. And as this is a time for work, and we have met to consider subjects that deeply interest us, subjects in which *all should* become interested, we will leave history to the historian, and confine our disjointed remarks to the present age, which is one of great intellectual activity, of deep and intense thought. In every department of life, in the sacred desk, at the bar and on the bench, with the disciple of Æsculapius, the author, the inventor and the scientist, there is an activity of thought, stimulated by the demands of the times, never before noticeable in this country. That demand is for a greater degree of skill and excellence in professions, which, by their learning, social and official positions, have become the acknowledged leaders in everything that pertains to the well-being of society, for to a great extent public opinion is moulded by them, and effect is given that opinion by adopting measures intended to

elevate and place society on a basis of enduring good. The demand is made, in tones not to be misunderstood, for researches in the great storehouse of human knowledge for discovery of that which is of the most practical value; for that which makes perfect; for a nobler and higher work; for an excellence that can successfully meet with and disarm the keenest criticism, and which will leave the mere sciolist to the mournful contemplation of his own failures. At no time in the history of this country has there been so earnest and honest an effort to elevate the standard of professional excellence as at the present. This effort is a happy recognition of the right the people have of making the demand to which I have referred. In the last one hundred years our country has grown and prospered as never a country did before. England, with her history running back beyond the middle ages, Germany, France, Spain and Italy, who thundered the laws of nations from imperial thrones before a white man had furled a sail on the Atlantic seaboard, or scaled the cliff of an American mountain, *come* to *us* to receive lessons in statecraft, in commerce, in inventions, in science, and in *dentistry* also. Why is this? It is due to and comes from our system of education; "our schools," the most important of which are our colleges. But, in speaking of schools we would refer to the *foundation* of *all*, the district schools, which are to be found everywhere. They are the nurseries in which have been nourished the greatest minds in our history. More than two-thirds of our statesmen, professional men, and successful business men, have sat on a rude bench, and racked their brains over hard problems in a district school. We believe in education. The professional men of to-day who stand in the front, at the bar, in the pulpit, and at the bedside of the sick, are men who began in the district school, and have been further trained in professional schools. Such men are in demand, because educated. Almost any audience, intelligent or otherwise, will listen to some old story, with tenfold more attention, and the lesson of that story is learned more easily, and the very soul of the hearer will be penetrated far more thoroughly, when told by a learned Paul.

The patient sufferer is grateful for the kindly encouragement, the womanly tenderness, the delicate manipulation, *skill* and *care* of the accomplished dentist.

In none of the learned professions is there any relaxation of

efforts to reach a point of super-eminence. It has been said a poet is born, not made. This can hardly be said of a dentist, for there are certain elements of power which he needs to specially develop. Among these are industry, perseverance, patience, humor and goodness.

About as foolish a notion as can lodge itself in the head of a young man is the idea that he is a genius, and therefore industry is not necessary to his success. A dentist *must* be industrious; one that is afraid to work, dreads the confinement that a dental office imposes upon him, and is indolent in study, may be considered a failure, and unworthy the confidence and support of the people.

Perseverence! Many dentists *fail* for want of this conquering element. Be sure you are right, then go ahead, and stick to it through evil as well as good report.

Patience — nearly every one associates the idea of patience with the name of dentist! How many of us possess it to any considerable degree? Is it not a fact that most of us *decrease*, rather than *increase*, our stock of patience by a too close office practice?

Tact — this is the most important element known to the dentist. Talent is something, but here *tact* is everything. It is that subtle "know how" which always unties the gordian knot of difficulty, and turns defeat into victory.

Humor.—Dentists should not be too sober and unbending; an appropriate, mirth-provoking anecdote may and often does have a most salutary effect in gaining the confidence of a timid patient which would perhaps never have been obtained in any other way.

Goodness.—Goodness is an essential part of greatness, and is also an essential part of the character of every true dentist. To fail as a dentist is to fall short of the object aimed at or desired.

The aim of the true dentist *should* be to develop himself in his triune nature—mental, moral, physical. What are the demands of the public of us? Where is the higher professional life? Where are the legitimate results of our important work? All the signs of the times point to a higher standard among dentists. Recognized authority places the dental among the learned professions. The public are exhibiting considerable interest in our

future prosperity. Opinion may be divided in regard to religion, politics, and various other questions at all times arising, but upon the subject of *dentistry* is becoming more united, and patients are becoming more interested in the operations they are having performed, and are beginning to call not only for the best you can do, but for the best that can be done. What would Hayden, Hudson, Parmley, Harris and others have thought, when seeking to establish a system by which dentists could become educated dentists, could they have foreseen the elasticity, the wonderful proportions and magnificent results of that system? They would have felt they were crowning an empire. These interests are committed to our keeping. Upon us more than any other men depends the realization of the hopes of those men. As we do our work well or ill, so will our reward be. I have in my mind to-day two pictures. One is of the men who laid the foundation of dentistry in this country so wisely, so successfully, and were so determined upon its success that they made it a life work, and thus provided for the object of their fondest hopes. We will never know of their anxiety, their uncertainty as to results. To me it is grand to think of those men thus preparing a blessing for their descendants to generations yet unborn. The other picture is an army—not of war, but of peace—whose white banners are to be seen not only all over our prairies, but upon every hilltop in our broad land, the rattle of whose musketry is but the light of chisels, burring engines, and excavators, in the battle with dental caries; whose heavy artillery confronts the problems of oral surgery; whose stands of arms are but a collection of materials with which we can not only impede the enemy's progress, but compel a halt and say "Thus far, and no farther, shalt thou come."

This army of dentists is fulfilling, in a peaceful way, the hopes of the above named men. This army is *never* enticed too far from its base of supplies, viz: "Dental Schools," and is prepared to successfully resist the assaults of the J. Foster Flaggs of the day, who so brazenly proclaim operative dentistry as at present practiced by the leading men in the dental profession a *failure*. Believing that we are aiming at a high degree of excellence, that this society was organized for that purpose, that we fully realize that ours is a profession which is indispensable, a power behind the throne, as great as the throne itself, is it surprising that in allowing our minds to wander from such a gathering as this to

those who have no sympathy with us, and impudently foist themselves upon the public as a large part of our profession, that in looking upon the motley horde our hearts are often made *sick* and *weary?* But upon this part of the subject I will not dwell, believing that education will *finally* right all these wrongs. Our field is among the growing generations.

Allow me to say that down the vista of the future, I catch gleams of a vision which tells me of the coming dentist, strong of body and mind, pure of heart and thought, trained in the lore of mind development, and enthused with zeal for his noble profession. It tells me also of a people embodying all advantages and resources of modern thought, giving him *public confidence*, and, above all this, I see our beloved State, "Queen of the West," second to none in this great Union. While I believe the good of the dental profession depends largely upon education and its elevating influences, there is yet something for us to do in the way of utilizing these. And in no one way can we do more in this direction, than in making a proper selection of dental students. Too little attention is given this subject. The selection of a student possessing all the qualities *desirable* as well as *necessary*, is not an easy task. Many are of the opinion that he should be a mechanic merely, but this is a mistake; and just here many boys and young men have stumbled, and in the same proportion have the carpenter and machine shops been the losers. Many have entered our ranks possessing all the qualities for a good blacksmith, with few, if any, qualifications for a dentist, and have had the good sense to see their mistake, and the courage to step down and out. Such men will surely succeed *somewhere*. Find out what you are fit for, and stick to that.

Like the barnacle that has fastened itself to the ship's keel, doing nothing *only* numbering one more among the thousands already there, for no apparent purpose but continually impeding progress, until it becomes, in sailor phraseology, a *drag*, are hundreds of men who have fastened themselves to the dental profession; men whose every saying, move or thought—if they ever have one, tends to impede its progress. It is true we cannot, like the sailor, dry-dock the craft and scrape off the barnacles, but we *can* and *should* make a desperate effort to prevent new acquisitions of like material. For one, I am opposed to the present method of taking dental students; and one reason, among many others,

is, that few, if any, dentists with anything like a full practice have the time to devote to a student. Consequently, first-class men are not student-taking men, and, as a matter of course, the students fall into the hands of incompetent men, and while there learn many things and ways that are not only *useless* but *detrimental*, and if they ever find their way to a dental college, will find it takes longer to unlearn their foolishness than it did to learn it. Consequently, I think the system, in its present workings, at fault, if not wholly wrong.

Some claim a student should understand technical terms before entering college. Does he get them in a third or fourth rate dental office? I say, when a young man wishes to become a dentist, let him go to a dental college, to men who have not only the time, but ability, to teach, and to do it systematically, and let the college decide as to his fitness and adaptability for the profession. Let such a course be universally adopted, and in less than ten years we would see few barnacles attached to the dental profession, and much less fault-finding with dental colleges. I am aware that the above opinion differs from that of almost every other dentist, but firmly believe there is less evil in the above than in the present method There are students in all professions who are apt to make the mistake of thinking that on graduation they are done with study, that their education is complete. But instead of commencement day finishing their education, it is but just begun. The discipline of the school-room is but a stepping stone to a higher intellectual and moral education, which can never be complete till life's lessons are all learned, and the book is closed by God Himself, to be opened by Him in Eternity.

TREATMENT OF TEETH WITH DEAD OR DYING PULPS; ALSO, TREATMENT OF ALVEOLAR ABSCESS.

BY DR. H. H. TOWNSEND, OF PONTIAC.

Mr. President and Gentlemen:

The great number of teeth that are now restored to comfort and usefulness, after disease or death of the pulp, or the pericementum has become inflamed or abscessed, which, but a few

years ago were lost, with little or no effort being made for their preservation, is certainly very gratifying evidence of progress in this direction. That there are still some obstinate and intractable cases which, despite the most patient and persistent treatment, have thus far proven incurable, while not so gratifying, is evidence that something yet remains to be accomplished. That the success attained by the majority of the profession in the treatment of alveolar abscess is largely due to the essays and discussions of the dental societies, I think will be admitted, and it is with the *hope* that by again debating this question, and comparing ideas and experiences, some new light may be afforded us, and some means and methods suggested which will enable us to treat successfully some of the now incurable cases, that I consented to write upon this subject. An abscess is said to be a collection of pus in a circumscribed cavity. Alveolus is defined as a socket. Hence a collection of pus in the socket of a tooth is an alveolar abscess.

The first symptoms of this affection are a slight uneasiness in the tooth, an occasional slight pain, and a little tenderness felt upon pressure. As the disease progresses, the severity of the symptoms increases to an acute pain, elongation and looseness of the tooth, which is so sore that the slightest pressure is unbearable. The gum over the affected tooth becomes swollen, dark red, and very painful. When pus has pierced the bone, fluctuation is easily felt by gently pressing upon the gum with the finger. In some cases there is considerable constitutional disturbance. The tongue is thickly coated; breath quite offensive; skin hot and dry; pulse full and bounding; bowels constipated; and in short, a real inflammatory fever is developed; the formation of pus being announced by a distinct chill. It is interesting to note the great difference in the severity of the symptoms in different cases during the formation of abscesses; frequently a slight soreness and occasional pain being all that is noticed by the patient until pus is discharged through the gum.

The principal causes of this disease are dead or dying pulps confined within the pulp chambers of the teeth; dead, or partially dead roots, which nature is making an effort to expel; and mechanical injuries. To which should be added as occasional causes: the imperfect removal of pulps; imperfectly filled canals; filling the apical portions of canals with cotton; and small canals

left untouched. The severity of the disease is modified by the diathesis and health of the patients.

Pathologically, an alveolar abscess is quite similar to a whitlow or felon upon the finger, the difference is principally that of location, both being an inflammation and suppuration of a periosteal tissue.

A brief allusion to the pathology of inflammation may not be out of place, inasmuch as a knowledge of these phenomena is necessary to intelligent treatment. It will be remembered that when an irritant is applied to a healthy tissue, a contraction of the blood vessels first takes place, followed by a corresponding dilatation—an increased flow of blood to the part; an adhering of the red blood corpuscles to the walls of the vessels, and also to each other until they become impacted, and the congestion results in complete stagnation—the dilatation being due to muscular exhaustion of the contractile coats of the vessels. If by any means this congestion can be relieved, the accumulated corpuscles sent off into the current, some stimulant afforded the exhausted coats of the vessels, and the circulation re-established—pus will not form, and the inflammation terminates in resolution. If, however, the congestion goes on to complete stagnation, suppuration must take place, and an abscess is the result. The length of time that an inflammation may exist, before terminating either by resolution or suppuration, varies as greatly as does the severity of the symptoms in different cases. Sometimes an abscess is formed only after weeks of inflammation, and again but few hours are required for the formation of pus.

The source of pus, the precise manner of its formation, of what it is composed, and in what respect it differs from the white blood corpuscles, are questions not yet definitely settled. Practically, with regard to the treatment of alveolar abscess, these are questions which concern us less than that of the *absorption of pus.*

Hamilton's Surgery, page 38, says upon this point that, "It is now pretty generally admitted that pus corpuscles, as such, are never absorbed; but that, after undergoing certain changes presently to be described, all the elements composing pus may return to the circulation; yet examples of the spontaneous disappearance of purulent collections, by disintegration and absorption, are certainly very rare. Its absorption is effected in the

following manner: First, the serum and salts constituting the most fluid parts are removed; second, the pus corpuscles undergo fatty degeneration and disintegration; finally, the pus corpuscles, thus metamorphosed and fluidified, are absorbed, also. In other cases, the serum alone is absorbed, and the salts, with the dessicated pus corpuscles, remain. The pus corpuscles, when thus separated from the serum, dried and aggregated, forming a cheesy mass resembling very much tubercular deposits; the salts when not absorbed remaining as cretaceous layers or nodules."

The treatment of alveolar abscess will depend upon the cause, and the condition in which we find it. If occasioned by a dead root, which nature is trying to expel, the extraction of the root will usually be all the treatment required. If from a blow upon the tooth, or other mechanical injuries, the pulp is still alive, and suppuration has not taken place, the inflammation may be arrested by preventing occlusion with the antagonizing tooth, and the frequent application to the gum around the affected tooth of the tinctures of aconite and iodine, two parts of the former to one of the latter. If pus has already formed, and the pulp still retains its vitality, every effort should be made to arrest the progress of the disease, as the pulp cannot long remain in a state of health if suppuration is allowed to go on; particularly if the sac is near the apex of the root. Here we have a case analagous to the whitlow or felon referred to: suppuration of a periosteal membrane, where the cause is removed. A felon freely opened as soon as pus is formed, usually requires little or no other treatment. The same is true of an abcessed tooth caused by mechanical injury, where the pulp is not diseased. It is rather heroic practice to cut through the gum and alveolus, but I think it is justifiable in such cases. I should, in addition to the opening, paint the gum with aconite and iodine, as there is always some congestion surrounding the suppurating tissue. Where an abscess is caused by a dead or dying pulp, we must first remove the cause. It frequently happens, however, that owing to the extreme soreness of the tooth, and the nervous condition of the patient, it is impossible to do more at the first sitting than to open the pulp chamber and afford vent to the pent-up gases, deferring extirpation and cleansing the root canals until the soreness subsides, which it usually does in a few days, especially if the aconite and iodine is applied to the gums. If the pulp is still too sensitive to

admit of extirpation, I should devitalize it with arsenic, using for the purpose not more than 1-250 part of a grain, combined with from 1-32 to 1-16 of a grain of morphia with sufficient creosote to moisten the pellet of cotton, covering in all cases with a temporary filling of gutta percha. It is important that the surplus creosote should be absorbed before introducing the temporary filling, as otherwise it might be forced out, carrying with it some of the arsenic. Accidents have been caused in this way. The length of time which arsenic should be allowed to remain in a tooth varies in different cases. I think, however, it may safely be left until the pulp is entirely devitalized; this varying from a few hours to several weeks. As the last portions of the pulp die, some soreness is usually felt, which generally disappears in a day or two. No further irritation is experienced until mephitic gases are formed, when extirpation should be no longer delayed. Perhaps the best time for the removal of the pulp is when it is entirely dead and sloughing has taken place, as it then produces no irritation, is painless, and more easily accomplished than at any other time. I know of no way of determining just when this has taken place, except by testing. Usually, I think it occurs soon after the soreness subsides, occasioned by death of the apicial portions of the pulp. I certainly would not advise the removal of a pulp when only partially devitalized, as it is a very painful operation to the patient, and is liable to produce inflammation of the tissues beyond the foramen, which is often very difficult to control.

It is not difficult to say that the pulps should be entirely removed, the canals thoroughly cleansed and perfectly filled; but to state just how this is to be accomplished is not so easy—will say, however, that for the successful removal of the pulp three things, at least, I regard as highly essential, viz.: The rubber dam, good light, and very delicate instruments, either entirely soft, or with an excellent spring temper. I wonder that any one should attempt the extirpation of a dental pulp, at the present day, without the aid of the rubber dam; yet I know it is the common practice of many operators. It is true that in a dry mouth the anterior teeth of the upper jaw can be kept tolerably dry with a napkin; but, all things considered, I doubt if as successful operations can be performed in any case without the rubber as with it. In the first place, then, I always apply the rubber

dam, and open the cavity sufficiently to thoroughly excavate the decayed dentine; also, open the pulp chamber, so that every part of it can be distinctly seen with the aid of a mirror. Then, with a warm air cavity drier, reduce the cavity to as nearly absolute dryness as possible; this bleaches the dentine, affording a much better light in the cavity. I then place my patient in the best light practicable; and here let me say that I think the want of a good light is *one* cause, at least, of many failures in removing pulps and treating roots, as well as in many other dental operations. We *must* have light to see what we are doing. At first I operated by a north window, but in cloudy weather my light was not satisfactory; next, tried a west—this, in dark days, was good only in the afternoon; I then tried a south, which I liked much better than either of the others. For the past five years have operated by a south and west. Each window is supplied with two curtains, a green and a white, the former so arranged that they can be lowered from the top, or raised from the bottom, and the light admitted from the top or bottom, or both at the same time, if desired. The white curtains raise and lower in the ordinary manner. This affords the best light I have ever had, and enables me to see into pulp cavities, and find root canals with greater ease than any of the former arrangements. Especially is this the case in operations upon the lower teeth. By shading the lower half of the window, the light admitted from the top only can be reflected into the pulp cavities with a concave mirror, enabling one to see distinctly where it would be impossible with the light admitted at the lower half of the window. Perhaps the best instruments yet placed in the market for removing the pulps of teeth are the broaches with a single hook at the point. The temper of the steel bristles is certainly excellent, but have never found any with a point well adapted to the purpose. The barbed broaches are only useful in large straight canals. They lack toughness of temper, the barbs are too long, and too far from the point They can be improved by cutting off the points at the first barb, filing down to a small size, leaving only two barbs nearest the point, and these very short. I think if the steel bristles had two or three very short barbs near the point they would be superior to any instruments yet devised for pulp extirpation. Great care is necessary in these operations to avoid the danger of forcing any of the pulp debris, or the point of the

instrument, or both, through the apicial foramen. These nerve bristles referred to should be used very cautiously, as their small size, smooth round surface, and excellent spring temper, render them well adapted to follow small curved canals, and they pass through the foramina so easily in many cases that the membrane is wounded before we are aware of it. If any one doubts this, let him take a recently extracted tooth, and try the experiments, and he will find that in many of the buccal roots of the upper molars, even, these instruments will readily pass through the foramina half an inch or more. How much more easily, then, will they pass through the palatine roots of the same teeth, and also the large straight canals of the incisors and cuspids. As accidents of this kind always produce more or less irritation, and as prevention is better than cure, it is well to explore root canals carefully. In many cases considerable advantage is gained by reaming out the canals, especially where the pulps can be removed only in fragments. A reamer will scrape off the particles adhering to the walls of the canals, which a broach or hook will not do. Glidden's reamers, while not all that could be desired, are very useful instruments, and have aided me many times. The reamers recently devised by Dr. Talbot are also very valuable, and although I have not been able to accomplish with them all that the inventor claims they will do, yet would not like to be without them. The canals in the incisors, cuspids, and bicuspids, are not usually difficult to cleanse or fill. Neither are those in the palatine roots of the superior, and the distal roots of the inferior molars. The buccal roots of the upper molars being smaller, and usually somewhat flattened and curved, are often difficult to treat, and sometimes even to find. The mesial roots of the lower molars are also flattened, and the canals usually more or less contracted, resembling an hour glass in shape — this contraction frequently resulting in two distinct canals. When this is the case considerable difficulty is experienced in following them their entire length, and perhaps in some cases it is impossible to do so. The right and left exploring instruments, with long, fine points, are valuable for finding these small canals. Frequently the canals in the buccal roots of the upper molars, are contracted near the pulp chamber, and if they are reamed out at this point, can be easily followed their entire length. For this purpose a three-sided broach, with rather a soft spring temper

and a small round point, is often sufficient. Any reamer for this location must be short enough to allow its entire length between the open jaws, that the instrument may be used in the direction of the canals. Glidden's reamers may also be used in the same way by cutting off to the desired length and molding some sealing wax or modeling compound around the shaft for a handle. The canals should be thoroughly syringed with warm salt water after the pulps are removed. This is best done with the rubber dam still in position. After drying the cavities with spunk, I use fine tissue paper cut in triangular pieces and rolled into fine points for drying the canals, principally. These are easily used in all except the small contracted canals. The process is completed with the warm air cavity drier.

I do not usually fill the roots at the same sitting that the pulps are removed. Consider it safer practice to wait a few days, as some irritation may result from severing the pulp vessels, or some pulp debris may have been forced through the foramen. Prefer, therefore, to leave some cotton in the roots, moistened with carbolic acid or creosote, to render it antiseptic, and fill temporarily with gutta percha. Neither do I regard it good practice to leave a cavity open after extirpating the pulp, as the food and fluids of the mouth soon find their way into the canals, where they decompose, often causing pericementitis, and in any case making it necessary to do the work of cleansing all over again. For temporary fillings I use the common red gutta-percha, with the addition of enough pumice stone to render it sufficiently hard and brittle to manipulate easily. It is much less expensive than the white gutta percha and answers the ordinary requirements of a temporary filling. I fill roots with the white gutta-percha, rolled out to the desired size with a warm knife. It is often necessary to cut off the extreme points to prevent carrying it through the foramen. For the small tortuous canals I use a solution of white gutta-percha in chloroform. This, I find by experiments out of the mouth, can be carried with a fine bristle into surprisingly small canals. For some years I used this solution quite extensively, but the time required for hardening, the shrinkage, and the ease with which it is carried through the foramina in ordinary canals, are objections which do not exist in the use of solid gutta-percha. Considerable difference of opinion exists as to the necessity of filling these small canals at all—my

own opinion being that it is by far the safer way to fill all canals that can possibly be filled, even though they require reaming and enlarging for the purpose. Have many times removed fillings from abscessed teeth and found the larger canals filled, but the smaller ones left untouched. The fact that cleansing, treating and filling these, resulted in a complete cure, is some evidence at least that the neglected canals were the cause of the trouble. As an experiment, I have frequently filled the larger canals, leaving the very small ones to take care of themselves, filling the cavities temporarily, and after a few weeks removing the filling, and the offensive odor, which I have invariably found to be present, is sufficient evidence to my mind that such is not safe practice. Have often been asked if I fill three canals in the upper molars. Will say that I do almost invariably. Indeed, do not now recall a single case of a first upper molar in which I have failed to find and fill three canals, for at least eight or ten years, and but two instances of failure to find the third canal in the second upper molar, and perhaps three or four in the third, during the same period. I do not claim that these have *all* been filled *thoroughly* their entire length. This, as we all know, would in many cases be an impossibility; but have approximated thoroughness, as far as patience, perseverance, and my limited ability could do it. Am decidedly of the opinion, that if the profession generally felt that they were to receive a fee for these operations, commensurate with the time and labor necessary to be expended, greater thoroughness would prevail, and consequently more uniformly successful results be attained. The theory, that if the *end* of the canal is perfectly sealed, the balance may be left unfilled, while theoretically correct, is, I think, objectionable in practice, as we can seldom, if ever, *know* that the foramen *is* entirely closed. If it *does* leak, the open canal becomes a reservoir for the accumulation of moisture, which soon decomposes, and the gases thus generated escaping through the leaky plug, become a source of irritation to the surrounding membrane.

As previously stated, the treatment of an alveolar abscess depends upon the cause, and the condition in which we find it. If in the earlier stages of inflammation, and the cause is a dead or putrescent pulp, the thorough removal of the cause, with antiseptics left in the roots, and aconite and iodine applied to the gums, relief will generally soon follow, and an abscess be pre-

vented. Among the various means resorted to for the purpose of preventing suppuration, are leeches applied to the gums, hot foot baths and cathartics, often with beneficial results. I am of the opinion, however, that where the inflammatory symptoms are sufficiently severe to require constitutional treatment, aconite and belladonna will usually afford all the relief that can be derived from the use of cathartic medicines. The heat, swelling, redness of the parts, the hot, dry skin, full and bounding pulse, pain in the head, and thirst, which are usually present in such cases, are symptoms more readily controlled by aconite and belladonna than by any other remedies I know of. I prefer either Fleming's tincture of aconite or the German tincture. Of the former, I generally use half a drop at a dose; of the latter, one drop. The belladonna I prefer in the second or third decimal attenuation, in one or two drop doses. These, in severe cases, can be given in alternation every half hour for two or three hours, when the interval can be lengthened to one hour, and, as the inflammatory symptoms subside, to two hours. The common tincture of belladonna, usually kept in the drug stores, is unreliable. The best I have ever used is the German tincture, obtained from the homœopathic pharmacies. The local remedies principally used in the treatment of alveolar abscesses are creosote, carbolic acid, iodine, salicylic acid, and the aromatic sulphuric acid.

The treatment after the cause is removed consists in bringing the remedy in contact with the pyogenic sac, cauterizing its entire surface, to break it up and promote healthy granulations. This is accomplished by injecting through the fistula, where one exists, with a Farrar's syringe, or by pumping the medicine through the root canal, where it is possible, using cotton wound on a broach for a piston. It often happens, however, that no fistula has been formed, and it is impossible to force the remedy through the canal. It has been recommended, in such cases, to drill through the root. This, in perfectly straight roots, if carefully done, is not bad practice; but, as we can never know positively that a root has not some curve, such a course is always risky. It is a little over eight years since I abandoned this practice; at that time two teeth were lost from this cause—an upper bicuspid and lateral incisor. The roots of both these teeth having an abrupt curve near their apices, my drill came out at the sides

I then decided to try cleansing the canals, treating with antiseptics, and trusting to nature for a cure.

When I state that no abscessed tooth has been lost since that time, where an opportunity has been afforded for carrying out my treatment, it will be inferred that the change has been a satisfactory one. The remedies which have given me the best results are the creosote of commerce (probably oily carbolic acid and creosote) and iodine. These I combine by dissolving the iodine in the creosote, leaving an excess of iodine.

After cleansing and drying as thoroughly as possible, I swab the canals with the remedy, using cotton wound on a broach for the purpose, leaving cotton in the canals saturated with the medicine, and sealing with a temporary filling. If the liquid is carried through the foramen, as is often the case, a burning sensation will be experienced. If the *liquid* does not go through, the vapors of the iodine will, if the cavity is perfectly sealed, unless the root is absolutely stopped. I treat these cases upon the hypothesis that where there is sufficient opening through the canal for the gases from a decomposing pulp to escape, the vapors of iodine will find an exit—am not certain but the vapors coming in contact with the sac are quite as efficacious as the liquid, though where I *know* there is pus, I am not careful to prevent the medicine from going through in liquid form. On the other hand, where I doubt the existence of pus, I *am* careful to prevent the liquid from passing through the root, as an escharotic applied to the already inflamed membrane would likely result in suppuration. The vapors, instead of being escharotic, act as antiseptics and gentle stimulants to the membrane and weakened coats of the vessels. As an evidence that the iodine does find its way through the roots in some form, I will mention the fact that in nearly every case where a fistula exists, the patient complains of the taste of iodine until the fistula heals, although the cavity is filled as perfectly as I can fill it. Thinking perhaps my gutta-percha fillings leaked, I have filled, in some cases, with cement, and the taste of iodine continued. Where no fistula exists, soreness sometimes results from stopping up the cavity, and the patient should be instructed to return at once, or remove the temporary filling, if necessary. The cases in which trouble is most likely to occur are nervous, debilitated patients, confined by indoor employments. The operator should be governed by

the condition of the patient at the time of treatment, whether it will be safe to seal up the cavity or not. The menstrual period, in delicate ladies suffering from uterine diseases, and the first months of pregnancy, are conditions requiring extreme caution.

I find by experiments out of the mouth, that iodine will go through the roots where carbolic acid will not. This was tested by winding the roots with cotton, and imbedding all but the crowns in plaster. I am aware that the conditions are not the same as in the mouth, but the fact that the odor of the iodine was found upon the cotton where no trace of the acid could be discovered, is evidence that the vapors of the iodine found an exit through the apicial foramina, where the acid did not. The principal objection urged against the use of iodine is that it discolors the teeth. Alcohol and carbolic acid have been used to wash it out. This they do by dissolving it, but at the same time it penetrates the dentine, leaving a slight stain. Aqua ammonia possesses the property of neutralizing the color of iodine; therefore, if the cavity is immediately washed with it, no stain remains. A colorless tincture of iodine is made by adding about one drachm of ammonia to one ounce of the tincture. In this proportion, the color disappears in about forty-eight hours. I have been using this, to a limited extent, for a few months, and think it will prove a useful remedy. It certainly seems to arrest the secretion of pus promptly. For injecting a sac through the fistula, I know of nothing better than an alcoholic solution of salicylic acid. This, if the root is properly cleansed and treated, and the patient is in fair health, will usually effect a cure. In those cases with large foramina, where chronic inflammation remains after the secretion of pus has been arrested, considerable benefit may be derived from the use of the tincture of hydrastis, calendula, or sulphate of zinc and sulphate of morphia, each five grains to the ounce. The cotton in the canals should be changed frequently during treatment, as, if left too long, it becomes offensive, causing irritation to the already weakened membrane. External poultices should never be used in the treatment of this disease, neither should an abscess be allowed to break upon the face. Where poulticing is necessary, a roasted fig applied to the gum, is sufficient. I stated that no abscessed tooth had been lost during the past eight years where an opportunity had been afforded me for carrying out my treatment. While this is true, I wish to

state distinctly that I have no idea that I can treat every case of this disease successfully. That I have been fortunate, I admit; but may fail in the very next case. I mentioned the fact reluctantly, and solely for the purpose of encouraging others to greater thoroughness and perseverence. I have two chronic cases under treatment at the present time which have given me considerable trouble, but both are nearly well, and I hope to save them. Will mention a case or two, which may be taken as an average of my cases and their treatment. Case 1st, June, '76.—Mrs. I., abscess right superior first molar. Tooth sore, face and gums swollen and very painful; had been under treatment for weeks. She had been told it would require from six weeks to three months to effect a cure, with doubt expressed as to the result. Applied rubber dam, carefully excavated the cavity, and found that an attempt had been made to extirpate the pulp, through a small opening in the pulp chamber, which was so far from being successful that the buccal canals had scarcely been touched. Spent half a day of diligent labor in cleansing these canals; syringed, dried, and treated with the iodine and creosote, as before described, sealing up the cavity as usual. Painted the gums with aconite and iodine, and dismissed the patient. In a few days the tooth was nearly well. I treated as before, and in three or four days filled the roots. In one week, filled the crown with gold. Last winter saw the case, and found it had given no trouble. Case 2d, April, '81.—Mrs. C., from an adjoining town, abscess of left inferior first molar, with pus discharging through fistula; also, pericementitis of right inferior first bicuspid. Was half a day cleansing these canals; treated and filled, temporarily, as described; came again in one week, and both teeth, apparently, perfectly well. Filled root in bicuspid, and changed cotton in molar, not having time, between trains, to fill the roots.

Occasionally chronic abscesses, occurring in debilitated patients, require something more than local treatment. It is well known that if an ulcer or canker patch upon the lip or cheek is cauterized while the patient is debilitated, it is made worse; but if a tonic is administered for a few days previously, one application of the caustic is usually sufficient for a cure. The same is true in the treatment of abscesses. This is illustrated in the following cases: A colored girl, with abscess of the antrum, was treated locally for some weeks, and at times it appeared nearly

well, but would again suppurate. A tonic of quinine and iron was prescribed, and the local treatment continued as before. From this time there was a marked improvement, which continued until a permanent cure was effected. A lady about seventy years of age, having worn an entire artificial denture for twenty years, was suffering from an abscess of the anterior portion of the superior maxilla, which had been treated by her physician for some months, local treatment being continued after coming under my care. This, like the former case, was cured only after the administration of a tonic. One more case I desire to mention, is that of a lady recently recovered from an attack of intermittent fever, and also debilitated by nursing a large healthy boy the second summer. An abscess of the left superior lateral incisor resisted all local treatment until a tonic was administered, after which one application of salicylic acid to the sac through the fistula effected a complete cure.

I have omitted, but wish here to state, that the only certain test I have ever found for the vitality of a pulp is the rhigolene spray applied to the tooth after it has been isolated by the adjustment of the rubber dam.

In conclusion, I will say that, aside from necrotic conditions, I think failures result principally from four causes, viz: imperfect cleansing of the pulp chambers and root canals, forcing foreign matter through the foramina, over medication, or the too frequent application of caustic remedies, keeping up the secretion of pus; leaving cotton too long in the roots until it becomes offensive, causing irritation; and finally, by not paying sufficient attention to the general health of the patients.

DISCUSSION.

Dr. Black: The paper described correctly the absorption of laudable pus. Absorption of decomposed pus is a very different matter and is sometimes of consequence even in alveolar abscess, though usually there is not enough of septic material to do serious harm. Occasionally, however, there is, as happened in the case of which you have all heard, in which Dr. Waters, of Boston, was accused of poisoning the man with arsenic who died from septæmia arising from an abscess occurring at the roots of a lower molar tooth.

Septic fever arises from the absorption of decomposed pus. It infiltrates into the surrounding tissues and enters the circulation, producing general blood poisoning. When this occurs, there should be vigorous treatment. The use of salicylic acid locally and quinine internally, is a good method. I was once requested by a surgeon to assist him with a patient who had received a load of small shot in the axilla. He expected to have to tie the sub-clavian artery, but upon our arrival found the man delirious from septæmia, and looking as if he would soon die. The wound was very offensive and the putrid material was being absorbed. The wound, which was large enough to allow the introduction of four fingers, was filled entirely full of dry salicylic acid, and very large doses of quinine were given. Within a day or two the man was conscious and so much better as to make it evident that he would not die with septæmia. He finally got well but lost the use of the arm.

Now, as to the object of this treatment. We had here a large wound filled with an offensive, watery, putrid pus, which was being absorbed into the circulation, producing septic fever and delirium. The salicylic acid was applied locally to stop the putrefaction — applied dry, in large amount and allowed to dissolve away in the fluids slowly, so that at all times there might be a saturated solution in contact with the adjacent tissues the more effectually to check local putrefaction, and if absorbed into the circulation, to have its influence over the septic material already absorbed, while the quinine was given to counteract the septic fever already present.

It is not often that alveolar abscess produces any serious blood poisoning. I have seen a few cases in which I thought treatment in this direction advisable. And we may find a case severe enough to endanger life, and then the treatment should be very vigorous. If the abscess can be reached I should pack it with dry salicylic acid, since most of the solutions, which contain enough of the acid to be effectual, are very irritating; and would give large doses of quinine. If the dry salicylic acid could not be placed where wanted, I would inject a ninety-five per cent. solution of carbolic acid.

In the treatment of root canals it is often very desirable, but very difficult to see well into them clearly. I often find the use of the head mirror of great assistance in this respect, using it as

occulists do with artificial light. A very strong light may be concentrated in the mouth and directed by the mouth mirror to the point where wanted.

There is no alveolar abscess, as the term is generally used, except following and consequent upon the death of the pulp of the tooth, and they are always found to surround the apex of the root. The term ought to be exclusively limited to this class of abscesses.

Dr. Townsend: I think an alveolar abscess may occasionally be found in the socket of a tooth having a live pulp. A patient of mine (a gentleman in Chicago), in May, 1872, while attempting to step upon a street car, slipped and fell, breaking off about one-third of the crown of the left superior lateral incisor, diagonally, but not exposing the pulp. A few days after the accident an abscess formed, the pus burrowed through the process and discharged upon the gum, then healed without treatment. In about six weeks after the accident I restored the lost portion with gold, the dentine being so extremely sensitive as to cause considerable difficulty in drilling retaining points. The operation was quite lengthy, and the force necessary to condense the gold produced considerable soreness. In two or three days another gum boil made its appearance, was lanced, and healed without further treatment. I saw the case five years after and the pulp was then alive and comfortable. I heard from it again last winter, eight years and a half after the operation, and it was still doing well.

In another case, in which there was necrosis of the outer plate of the superior maxilla caused by mercurial poisoning, I removed a portion of the outer plate, extending from the right lateral incisor to the first bicuspid, exposing the labial surface of the root of the cuspid; yet the tooth was saved and the pulp remained alive.

I see no reason why an abscess situated within the alveolar walls should not be called an "alveolar abscess," whether its exact location be upon the side of the root of the tooth or surrounding its apex.

Dr. Dean: What action does carbolic acid have upon the sac of an abscess, and what becomes of the sac? Is it absorbed or ossified?

Dr. Morrison: I had a case in which a lateral incisor presented every appearance of abscess, but there was no cavity, no

discoloration, the pulp was alive. The abscess opened on the gum and was discharging pus. After dislodging a piece of dead bone from the neighborhood of the apex of the root, it got well and the pulp in the tooth is now alive.

DR. BLACK: I do not wish to be misunderstood. These are cases of sub-periosteal inflammation, and they arise from different causes and require different treatment from true alveolar abscesses, which should be defined as "abscess around the apex of a root, arising from irritation, produced by death of the pulp of the tooth," or "trouble in the root canals." We are all agreed as to the character and location of the disease in these cases, the only question is whether we shall call them all alveolar abscesses, or whether we shall restrict that term by the definition that I have suggested.

DR. BROPHY: Many persons seem to suppose that suppurations located anywhere in or about the alveolar processes, or the necks of the teeth, are alveolar abscesses.

I agree wholly with Dr. Black that the term "alveolar abscess" ought to be limited to abscesses within the alveolus, and surrounding the apex of the root, involving, as a matter of course, the previous death of the pulp.

I will try to answer Dr. Dean's question as to the action of carbolic acid upon the sac of an abscess. It is presumably similar to its effect upon any of the soft tissues, which is to coagulate the albumen in them, and cause contraction, producing an eschar, which remains. If there is a cavity it is usually filled with connective tissue by granulations.

DR. CUSHING: I think Dr. Townsend misapprehended Dr. Black's definition. Alveolar abscess, as defined by him, cannot exist except after the death of the pulp, but there may be abscesses located in the same neighborhood, and having the same general appearances, not involving death of the pulp. For instance, a case was presented to me which appeared in every way like an ordinary alveolar abscess of a lower wisdom tooth, except that when extracted, the sac, which was very large, was found to be located upon the side of the root, instead of around the apex; it was discharging at the margin of the gum.

I believe, as Dr. Black does, that the term "alveolar abscess" should be confined to those surrounding the apex of the root.

Dr. Black: I call those gingival abscesses which are on the side of the root, not at the apex, and discharge at the margin of the gum.

These various abscesses are very different in causation and treatment from true alveolar abscesses, and it is important that these distinctions should be made.

Dr. Suddith: According to the latest writers, all abscesses occurring in or around the alveolar processes are called, in general terms, alveolar abscesses. Those arising from death of the dental pulp, being in the alveoli of the alveolar processes, are termed, "Dento-alveolar abscesses."

Dr. Cormany: I had two cases of abscesses about the same time, one a left lateral incisor, and the other a left central incisor. Neither had any cavity of decay. Upon opening one of them, found the pulp chamber filled with pus, and in the other a live pulp which I destroyed and removed. Injections of carbolic acid through the teeth, so as to come out at the fistulas, resulted in speedy cures in both cases. The trouble in the one having the live pulp was caused by a blow.

Dr. Gilmer read the following extract from an article in the *American Journal of Dental Science*, of the year 1855, by Dr. Ballard, for the purpose of showing how little change there has been since then in the treatment of alveolar abscesses:

"My usual method of operating at present is as follows: After carefully removing all decay (if any exists) from the external cavity, I cut directly into the nerve cavity, making as large an opening as is necessary for convenience; then, with suitable instruments, remove the decomposed matter from the canal, together with the discolored bone, which, in many instances, is found at the most depending portion of the pulp cavity. In some cases, however, of long standing, particularly where the teeth are soft and delicate, to remove all this discolored portion would render the crown of the tooth so weak as to endanger it; an allowance must be made for these cases.

"It is also important that the softened dentine, found near the apex of the fang, should be removed. This done, the canal must be washed throughout its whole extent with pure water, using for this purpose a small but powerful syringe, having the tube so bent as to allow of its introduction in the nerve cavity.

The cavity should then be dried by filling to the apex of fang, or fangs, with floss silk, taking as fine a strand for each fang as can be successfully managed with the instrument, and leaving, for convenience of removal, a portion of each strand protruding from the cavity, to the length of an inch or more. This done, I slightly moisten some strands of the silk with creosote, and then, removing the first strands, I immediately refill with the latter, and then close the external opening with wax. The amount of creosote required, and the length of time I allow it to remain, depends much upon the time it has existed, and the amount of decomposition to be overcome, but more upon the effect produced by the remedial agent itself—some of the apparently worst cases having been quickly cured, while others, comparatively simple, have required a course of treatment that has extended over weeks.

"I usually examine these cases every twenty-four or forty-eight hours, renewing the floss silk *with creosote*, if it seems necessary, and without it when the first application seems to have been effectual. If, after discontinuing the creosote for twenty four or forty-eight hours, no trace of the odor of decomposition can be detected, I fill the fangs at once to the apex with gold, leaving the crown to be filled at a subsequent period. I make this delay in completing the operation with the view of avoiding the danger of periosteal inflammation, which might be the result of too much pressure at so critical a juncture. In many recent cases of abscess it is only necessary to make one application of creosote, allowing it to remain twenty-four hours. In some cases, however, I have been obliged to renew it ten or twelve times. The discharge usually ceases before the creosote has had its full effect. I have known it to cease, and after the removal of the creosote and the substitution of the dry floss, to recommence. Of course, the creosote should be renewed under these circumstances."

DR. TALBOT: One would suppose from the paper and the remarks that an alveolar abscess is usually caused by septic pus from a suppurating pulp. Instead of that I believe it is usually caused by the gases of decomposition from a dead pulp, and some of the worst cases are caused by these septic gases. When these cases are presented to us in the earlier stages, the tooth sore and gums inflamed, and we find the pulp chamber and root canals

filled with foul gases and putrescent pulp tissue, the less we do for them at the first sitting the better, except to open freely into the pulp chamber to allow free escape of the confined gases. If we use pressure in the canals, or poke around much in them, we shall force these septic materials through the apex of the root and cause a worse abscess than would have occurred if we had left the tooth entirely alone. They should be opened and left with no other treatment for several days, until the soreness and inflammation of the periosteum and surrounding parts has subsided. Then carry in carbolic acid, renewing it frequently until all septic odors are absent, and the roots can be thoroughly cleansed without danger.

I wish to say a word or two about root fillings. I believe that gold is the worst material that can be put in a root canal. We *may*, in favorable circumstances, be able to close the apex tightly with it, but it cannot be packed closely against the sides of the canal, and fluid will infiltrate from the tubuli and become decomposed so that the walls of the root canal will be blackened. If the apex does not happen to be tightly closed, the interstices among the pieces of gold will often be sufficient to hold fluid enough to cause trouble after a while by the products of its decomposition.

Dr. Kitchen asked Dr. Morrison to describe his method of filling roots with pure gold wire.

Dr. Morrison: I use for that purpose pure gold wire of different sizes, according to the size of the canal to be filled, shaping as nearly as possible to the form of each canal, by repeatedly trying in the root and filing the places that rub until it can be carried to the apex, and is as near as may be the size and shape of the canal. It is very soft and will readily bend to inequalities and curves.

When properly fitted, the required length is partly cut off with a revolution under a sharp pen-knife, so that it can be broken or twisted off after insertion. It is then dipped in cream of oxychloride of zinc and driven in till the end reaches the apex of the root. This plan obviates most of the difficulties referred to by Dr. Talbot. I do not often enlarge root-canals with drills or reamers of any sort, but leave them in their natural size and shape.

THE PAST, PRESENT AND FUTURE OF MECHANICAL DENTISTRY.

BY L. P. HASKELL.

WHEN your committee requested me to prepare a paper for this meeting, and the subject was called for, I said it might be "The Past, Present and Future of Mechanical Dentistry." So I will offer for your consideration, in a few words, some thoughts, intended to awaken inquiry, and provoke discussion upon this subject.

While there has been, during the last thirty years, great advances made in Operative Dentistry, in its material, instruments and methods, it is true that during the same period there has been little or no progress made in Mechanical Dentistry, so that practically the past and present of this branch of dental science, during this epoch are synonymous terms.

The cause of this condition of things has been mainly owing to the introduction of vulcanized rubber, by means of which a horde of quacks have foisted themselves upon the community, and cheap John, "$8 set" shops have been made possible. To such an extent has a demand been created for these cheap sets, it has discouraged the profession generally from recommending and urging upon their patients the use of a better, healthier and more artistic mode of inserting teeth, requiring more expensive materials, and greater mechanical skill and artistic taste, but of course, producing a piece of work of greater intrinsic value.

A little more than thirty years ago the use of plaster-of-Paris for impressions, began to come into general use. There has been nothing better for reliable impressions, in *all* cases, introduced since.

Thirty years ago a partner of mine, in Boston, Dr. D. H. Goodno, after much experimenting for a suitable metal for dental dies, using zinc, tin, type metal, fusible metal, brass and iron, at last tried "Babbitt metal," then but little known, and it remains to-day the *only* metal that has all the requirements of a dental die, viz: non-shrinkage, hardness, toughness, smoothness, and melting at a low temperature, so that plates swaged upon these

dies, fit the mouth as they do the plaster cast; seldom is a second die required. And yet, our dental colleges, with one exception, I think, and the great mass of the profession, still plod along in the use of zinc with all its annoyances.*

Thirty years ago, the profession were just abandoning the use of spiral springs for retaining plates in the mouth, and beginning to use atmospheric pressure for that purpose; the plate was swadged to fit the plaster cast, sometimes raising it slightly over the hard palate. To day no better method exists.

Thirty years ago, metal plates were used exclusively, and to-day they are the only suitable material, in all respects, for artificial dentures.

Thirty years ago, "gum sections" were carved for each case, and mounted on gold plates, and were used very extensively throughout the Eastern States. But to-day the *moulded* sections have taken their place, and the result is a stereotyped, stiff and unnatural looking system of artificial teeth.

Thirty years ago, Dr. John Allen brought to the notice of the profession his "Continuous Gum Work," and it remains to-day unchallenged as the only perfect method of constructing artificial dentures, and I must confess I see little room for improvement.

Thirty years ago, it required at least a fair degree of mechanical skill to make and insert a set of artificial teeth. To-day the merest tyro can buy a set of "gum sections," a piece of rubber, take an impression, and make a so-called set of teeth. But it is sickening to witness the result, as one moves along the street, enters the public assembly, or the social circle. "Artificial teeth" written everywhere. This is the Present.

What is to be the Future? It is to be just what an enlightened, progressive profession shall choose to make it.

---

*For the information of those desiring to use Babbitt metal, the following suggestions are offered. Much of this metal that is for sale is unreliable. The better plan is to make it, as follows:

Copper, 1 lb.; antimony, 2 lbs.; tin, 8 lbs.; melt in a crucible—in a forge or other intense heat—first the copper, next the antimony, then remove from the fire, and add the tin, and turn off at once into small ingots; remelt so as to thoroughly mix. After moulding and casting the Babbitt metal die, when it is cool, wash it over with whiting. For the *counter* die use lead with about ⅛ tin added, stirring till it begins to thicken, and pour. With these precautions there is no danger of the dies uniting, or of ever making a failure. Sand moistened with sweet oil will remain in condition for use many months, and is far preferable to that moistened with water.

To make it what it ought to be, it will be necessary to create a public sentiment that shall demand something besides rubber or celluloid, as the best, or even a good, material for plates. Let your patients know that these vegetable bases are, to a greater or less extent, injurious to the mouth and often to the stomach; that thousands of mouths are ruined by their use, in consequence of the undue absorption of the alveolar processes, always induced, to a greater or less extent, by the non-heat-conducting qualities of these materials; and also the more serious effects often produced by the poisonous qualities of the coloring materials of red vulcanite.

Then the Dental Colleges ought to impress these facts upon their students.

More time should be devoted in these institutions to instruction in the practical details of the laboratory, even at the sacrifice of some of the dry details of theories about matters of little or no importance to the student; more instruction in *metal* work, and less in vegetable bases; simplifying processes, and abandoning obsolete methods and ideas.

More attention should be paid to the artistic, or the esthetic, requirements of mechanical dentistry: then we should the oftener witness teeth selected and arranged as nature would have them, the contour of the mouth restored, and harmony of the features re-established.

It would be better for the interests of the profession if there could be a division of practice, so that it would be an object for dental students, so disposed and having a taste for the mechanical department, to prepare themselves for the exclusive practice of this branch of the science.

I would not entirely dispense with the vegetable bases, for the reason that many are unable to afford anything better, but would advise their use only for that reason. And, when used, advise the use of plain teeth, as by that means more artistic results can be obtained.

Dr. Swain and Dr. Antes warmly endorsed Dr. Haskell's paper, and Dr. Antes said he thought the mechanical and operative departments ought to be separated.

Dr. Haskell not being a member of the Society, a vote of thanks was tendered him for his paper.

DENTAL HYGIENE.

BY DR. W. P. RICHARDS, OF ELGIN.

Hygiene is that branch of medicine which has for its object the preservation of health by the prevention of disease.

Dental hygiene, then, will have in view the preservation of the teeth by prevention of the causes which induce their destruction.

Medical hygiene has done more to prevent disease and alleviate the sufferings of humanity than all the drugs ever made have eradicated.

When the masses of the people become more thoroughly educated to a knowledge of hygiene, when generation after generation shall observe the laws of health, then may we look for still greater results in this department.

If our profession is to meet the increasing demands made upon it for the preservation of the natural teeth, I firmly believe it must be through hygiene, medical and dental. They cannot be disconnected.

The loss of the teeth is almost wholly caused by caries and the effects of salivary calculus or tartar.

It is not the object of this paper to enter into an extended consideration of the causes of caries, but it will be necessary to review the matter so far as it relates to the subject before us.

The causes of caries may be classed under two headings: those of a general or predisposing nature, and the local or directly exciting causes.

Among the predisposing causes, I consider transmitted imperfect tooth tissues to be the greatest, arising largely from defective constitutional development, and susceptible under favorable influences to improvement, as are most hereditary defects.

We inherit our real character of physical constitution, and this is modified and influenced by conditions and surroundings in early life.

As a rule, the teeth partake of the inherited imperfections and qualities of the whole system, and anything that injures the whole affects every part also.

If parents have organic ailments, if the principal organs of vitality are diseased, these defects may be transmitted.

If imperfect tooth germs are formed in the fetus, the teeth will be of poor texture, and thus unable to resist destroying forces.

Much will depend upon the character of the food eaten by the mother during the periods of gestation and lactation, as well as the subsequent conditions and health of the child.

Functional disturbance of the processes of digestion, assimilation, respiration, etc., in early life, may cause malnutrition, and thus produce teeth of poor structure, deficient in amount and quality of lime salts.

More especially is this true before the eruption of the teeth, when calcification of the earthy portion of the crowns is in progress.

The debilitating effects of the diseases incident to early childhood, may act as predisposing causes of decay.

This is often shown upon the teeth where an arrest of the development of the enamel has occurred, caused by deficient nutrition.

Food of improper nature or lacking in the phosphates for the upbuilding and growth of the system, as well as climatic influences, may act as predisposing causes.

Any untoward influence that creates an impaired constitution gives a predisposition to caries.

The chemical or acid theory of caries is now almost universally adopted by our profession as a directly exciting cause of decay.

The acidity may arise from systemic or local causes.

Prof. Wedl says, many forms of dyspepsia, scrofula and diabetes may produce an acid condition of the mixed saliva.

In several of the worst forms of decay, I have found the saliva of the parotid gland giving an acid reaction.

In its normal condition, the secretion of the salivary glands is slightly alkaline, and, if secreted in abundance, aids to neutralize the acid mucous secretions, or acids generated in the mouth by the decomposition of food and organic matter; also acids taken directly into the mouth.

The secretion of the mucus from the mucous glands, as well as from the entire mucous membranes of the mouth and digestive tract, may become acid and act directly upon the teeth.

But I consider that acids formed in the mouth from the decomposition of food and organic matter in the mucus and saliva, to be the greatest direct cause of the loss of teeth.

The albuminous matter in the saliva, in many debilitated persons, is viscous or sticky, and readily adheres to the teeth upon rough surfaces and depressions, and aids to catch food and organic matter.

These organic matters under the influence of heat and moisture, soon undergo fermentation, and we have acids formed of various kinds, some acting upon the enamel only, while others attack the dentine and cement.

Little is known of the phenomena of fermentation, but during its process compound bodies are separated into their simple elements by coming in contact with nitrogen, or bodies containing nitrogen.

Putrefaction takes place in bodies which contain nitrogen.

We have in the mouth the ptyalin, the effete epithelium of the mucous surfaces of the mouth and the albuminous matter of the buccal glands, all substances which act as ferments upon organic matter taken as food which finds lodgment around the teeth.

From putrefaction of nitrogenized bodies, as animal food, casein and albumen, acids are formed.

If we accept the foregoing views, it is evident we have at least a partial basis on which to found a system of dental hygiene.

General causes should be met by systemic, and local causes by local treatment.

As to the direct therapeutic treatment for imperfect tooth tissues, we are without sufficiently accurate knowledge to base any treatment which will guarantee any given result.

Dental hospitals or orphan asylums, where large numbers of children are fed upon the same food and have the same surroundings, would be a fruitful field for extended experiments in this direction.

In the absence of anything direct or specific upon this important part of our subject, I can only say that a close observance of the laws of life and health in early life, and a good supply of food, rich in the phosphates, cannot fail to be beneficial.

When a patient applies to us for treatment of the teeth, we should first diagnose the case, to ascertain, if possible, the cause of the difficulty.

For this the litmus paper will be one of our greatest aids, and it should be used in different parts of the mouth, to test the reaction of the various secretions.

If we can get hold of the cause of decay or disease in each mouth we are called upon to treat, and point out the remedy, or lessen injurious influences which may be at work, we will have done our patient a more lasting good than any dental operation.

Often do we find dental work of the highest order, amid surroundings that are but the essence of filth and uncleanness, and the person wonders why the teeth decay or the fillings drop out.

This, you say, is the fault of the patient; but if the dentist failed to understand and point out the cause of decay where possible, and especially if he did not insist most positively upon thorough cleanliness, his duty was poorly performed.

If the causes of destruction are allowed to remain, if the destroying forces continue to work, the effects will be seen in the near future.

In diseases and systemic ailments which produce an acid condition of the secretions of the mouth, it is evident that a restoration of the system to a healthful state must be effected before caries can be arrested.

The aid of the physician may be necessary, but I wish to remark right here, that the dentist should be informed well enough in regard to these general conditions and diseases, and their local effects upon the teeth and in the mouth, to ascribe the lesions to their causes, and thus proceed intelligently in whatever is required.

From observation I am of the opinion that very much of decay is owing to lack of cleanliness.

If this is not the case, why are more decays found upon the approximal surfaces?

As soon as the temporary teeth begin to erupt they should be brushed thoroughly by a soft brush and tepid water, so that all organic matter may be removed before fermentation and the formation of acids.

Mothers should be taught that this is absolutely necessary, not only for the present good and happiness of the child, but they should be impressed with the fact that upon the care and retention of the deciduous teeth much of the future of the permanent depends.

The nervous system is more susceptible to irritation in childhood than in adult life; the temporary teeth are more vascular, and

if carious and diseased, more quickly act as exciting causes of general ailments.

Usually these young sufferers are the victims of gross neglect.

If thorough cleansing from the beginning had been the habit, exposed pulps, abscesses and sleepless nights would be rare among them.

Incipient decay is often formed from the retention of food by the overhanging margins of the gums during eruption.

Cleansing during the periods of eruption of both sets is very essential.

Probably all of us have seen the pernicious effects of acid medicines upon the teeth.

The mineral tonics are freely prescribed in many diseases, and often the effects are deplorable.

After having put a patient's teeth in good order, with instructions to properly care for them, it is very mortifying to see that person in a year or two, with teeth nearly destroyed, or many of them in bad condition.

I have had such cases, where the trouble was clearly owing to medicines alone, and have seen others, where such a result occurred after pregnancy and childbirth, when the tonics were given.

How much of the result was to be ascribed to the medicines in the latter cases cannot be determined, for during the periods named there are unusual demands upon the entire organism, and the teeth often suffer, as do other parts of the body.

After iron tonics are given, the teeth become a brownish yellow, which is difficult to remove, as the stain penetrates.

When necessary to give these medicines, the patient should be apprised of the fact, and instructed to use some alkaline mouth wash, as lime water or solution of bicarbonate of soda, taking the medicine through a glass tube.

Physicians should be more careful in this matter, and we should call their attention to it whenever possible, as well as warn our patients.

Injurious dentifrices and tooth powders are to the dental what patent medicines are to the medical profession.

Usually those who clamor most loudly for "something to cleanse their teeth" use the brush and toothpick the least.

I do not know when the idea of using charcoal originated,

but those who have used it to any extent usually have deep grooves across the necks of the incisors.

Most of the tooth brushes in market are poorly adapted for their purpose. Some that I have lately seen, having bristles of unequal length, thus giving an uneven surface, are an improvement.

The manner of using the brush is important, an upward and downward movement, as well as across the teeth, will be more effective.

Quill toothpicks and floss silk will be necessary for the approximal surfaces.

For common use I recommend precipitated chalk (carbonate of lime), as it neutralizes acidity and has a pleasant effect upon the gums.

Frequent examinations should be insisted upon, for by them attention can early be called to a matter that, if allowed to run, would be serious.

The most of our profession are very remiss upon this whole subject of hygiene. To get our patients to understand the importance of cleansing their teeth, and thus aid our efforts in their behalf, is one of our highest duties to them, and the greatest service we can render.

Indeed, right here we need a "new departure," and he who induces his patients to cleanse their teeth will save more teeth than all other systems or departures.

It will be necessary only to mention salivary calculus as a dental destroyer, to give us one more argument in favor of cleanliness.

DISCUSSION.

DR. BLACK: The subject of Dental Hygiene is a very important one. We need not spend time in discussing its importance, but what are we to do about it? What are the facts, and what do they indicate? We can do the most in our individual capacity, with individual patients. The education of the *public* is a very slow and tedious process, but when we find teachable *individuals* we can accomplish much good. In order to do so, however, we must be informed ourselves. We have great difficulties yet to surmount, before we arrive at sufficient definiteness of knowledge

to give specific directions in regard to diet and habits of living, so as to obtain the positive results that we desire in individual cases, as regards the original structure and permanent preservation of the teeth. The effect of different modes of living upon the health is very little known. It is said that if we lived naturally we should not have decayed teeth. Probably man has not lived naturally for many thousands of years. The old Indians, who inhabited this continent before the historic period (the mound builders), suffered much from caries of the teeth, though of a different sort from what we do. Just what can be done by modes of diet is but little known. In some cases of rapid decay, benefit is derived from a diet largely of fruit, though that is sometimes difficult to maintain continuously. I believe the brown bread hobby to be a failure as to its direct effects upon the teeth, though it is useful indirectly by its benefit to the general health.

Perhaps we can do most with the class of cases in which the teeth are lost by the absorption of the alveolus, or Riggs' disease. In places where most of the people have their teeth taken care of by good dentists, more teeth are lost in that way than by caries. For the preservation of these we can do very much by hygienic instruction and care. Just *what* we shall do must be determined by each for himself.

Dr. Kulp: This is a subject upon which I have thought much and experimented a great deal for more than twenty years. Sometimes a little experimenting will overthrow a good deal of theory, but I don't believe the brown bread theory to be a failure. I know it is not. I had in my care, professionally, a family of eight persons, who were high livers and had poor teeth; caries showed itself in the children's teeth very early, and threatened to be very destructive. I was quite a fanatic at that time on this subject of "brown bread," and having the confidence of the mother and the coöperation of the father, I induced them to try the experiment of using persistently a diet of brown bread and phosphate of lime foods. The improvement in the teeth of the children was speedy and very marked, and their tendency to decay almost entirely ceased.

My wife, for a time after our marriage, had persistent decay of the teeth, and they were very sensitive; but a change of diet brought about a marked change in the character of her teeth

within two years. My family have trouble with their teeth very soon if we discontinue the specially phosphatic diet usual with us. I have many families of Germans under my care, and I have noticed the frequent and often rapid change for the worse in the character of their teeth after coming to this country,and I believe it is owing to the change they usually make in their diet after coming here. I am convinced their superior teeth (while they remain in the old country) are the result of better food preparation than is common here. If I had the power I would destroy every bolting machine in America. Another fault in our food preparation is that we cook it too much, and prepare it in such ways that nearly all of it is soft, and does not offer enough resistance to cleanse the surfaces of the teeth, or to give them or the jaws sufficiently vigorous exercise. I once saw a wolf at the zoological gardens at Niagara Falls, with his teeth badly decayed and incrusted with tartar. The keeper informed us that as long as the wolf had been fed upon bones, scraps of meat and hard crusts, his teeth had remained good, but after he began to feed him on the fragments from the table his teeth soon became decayed.

The Germans, in their own country, have a habit of eating, once a day, a very hard brown or black bread, as hard as a whetstone, and very coarse; they eat it themselves, and feed the same to their horses. The mechanical operation of chewing this hard bread is, no doubt, an important factor in producing and preserving the excellent teeth which Germans usually have in their own country. Most people in this country ought to eat more brown bread, and less warm and soft food.

No one can have good teeth who does not have good general health, and this cannot be without taking good care of the skin in regard to cleanliness. People sometimes need to be instructed or reminded respecting even the simpler and ordinary laws of health, and the dentist can do as much for the general health of the people as the physician.

DR. TEMPLETON: I have given the subject of Dental Hygiene some attention. It is a very large subject. It has no beginning, middle, nor end. The paper said that food should be rich in phosphates. How can we have it so? Some kinds of food are known to have more of the phosphates in them than others, but

the management of our farms is such that much of the food we get does not contain its proper and natural amount. Our farmers continually send away from home the phosphates which the soil produces, in the form of grain, the bones of cattle and hogs, shells of eggs, etc., etc., and continue to do so, year after year, without returning to the soil any of the phosphates of which they have robbed it; till, after a while, the grain, and other products of the farm, will contain less than the natural proportion of phosphates, because the plants grown there cannot find it in the soil. If cows were pastured on land that had been sown with bone phosphates, the milk from them would be richer in bone and teeth-making material.

Dr. Taylor: There are two essential points around which the various parts of this food question group themselves. One is the supply of the proper amount and quality of nourishment; and the other, the power to assimilate it. If you give the same kind of food to a hunter, or any man engaged in active, out of-door exercise, and to a sedentary man living in a cellar, the amount taken and assimilated, and the results in the development of power and the promotion of health, will be very different in the two cases. Though many things may be said against the food we eat, and our various habits and modes of life, I believe, notwithstanding, that we are better fed, better housed, and better clothed, than any people ever were before, but the benefits we ought to derive therefrom are neutralized by other things.

Dr. Sitherwood: The paper said that the laws of health should be observed. Just what they are, in all the details of their application, it is somewhat difficult to know. It is said that bones, and brains also, require phosphates in the food. In Bloomington, where I reside, there are many schools and a large number of students reside there. I have noticed some hard students whose teeth had been previously good, but began to decay rapidly in a few months after entering school, and I could accomplish nothing for their preservation till they stopped studying. Have any of the older men present noticed cases like these? and does the mental effort divert the nutriment which the teeth ought to receive? or is the injury to the teeth wholly owing to the injury to the general health?

DR. HARLAN: Dr. Sitherwood has struck the key note; just in proportion as children are *forced* to acquire knowledge at too early an age, do their teeth suffer. Such children are nervous and fretful, and troublesome to work for, and the teeth very liable to re-decay after filling. Such children often graduate at sixteen years of age, instead of waiting until twenty, as they should, and sacrifice their teeth in doing it.

Some families are so negligent of their children's welfare as to send them to school at four and a half years of age, to get them out of the way; and they often get their permanent central incisors at six or seven, instead of waiting till eight or nine, and the teeth are very poor in consequence of their forced and premature mental development.

DR. A. W. FREEMAN: We know a mother who always, as a rule, keeps Graham bread upon the table; while wheat, or white bread, is not excluded. The children, until of considerable age, commonly make their suppers of Graham bread and milk. Meats and a plenty of vegetables are served at breakfast and dinners. Rich pastries are always excluded.

The father and mother have lost their teeth — the children's are excellent. The oldest daughter, now in her teens, has been hard pushed in music, French and the classics, for the last six years, and yet has graduated with a perfect set of teeth.

We think these results are largely due to pure air, right living, and cleanly care of the teeth.

We are acquainted with another family where there is a daughter who has a distaste for all meats, and never eats them. She cares little for vegetables, and lives almost wholly upon white bread. Her teeth are very poor and have often to be refilled.

There is also a class of persons who become confirmed dyspeptics at an early age. Their teeth, like their bodies, seem to suffer for want of well assimilated food. What can we do for them?

There is no subject more important for us to understand, than diet in its relations to tooth building.

What is sound advice on this subject?

DR. CRESSWELL: Practical observation will convince any one that food has an influence upon the condition of the teeth. In the case of the teeth, the mechanical action upon them of the food, while being masticated, is of great importance, furnishing

exercise for them in proportion to its hardness and the thoroughness with which it is masticated, and by its friction helping to cleanse them, keep them free of deposits of tartar, and preventing the stagnation which always favors disease and decay. All this is strikingly illustrated in almost any mouth in which are teeth having no antagonists.

Dr. Taft: This is a very important and interesting question to every one. It has so many phases and branches, that I am undecided which to consider.

There is one subject, however, to which I will call attention: that is the hygiene of childhood. If a good foundation is laid at the beginning, and proper care in all respects exercised through childhood and youth, embracing training and correct habits, there would be much less of disease and feebleness in after life than usually exists. Children often suffer greatly through the results of faulty hygiene, and oftentimes in almost everything pertaining to it.

How seldom it is that proper food is given during this period of life, though improvement is being made over former times in this respect.

The influence of light, fresh air, exercise, moisture and temperature, is either but little regarded, or almost wholly ignored by a very large proportion of those who have charge of children. How few have been well cared for in these respects up to ten or twelve years of age!

Even food that does contain the elements of proper nutrition is so prepared, in many instances, as to entirely fail in one of its important uses, viz: that of giving proper exercise to the teeth in mastication, and proper stimulation to the salivary glands. Because of this the teeth of children suffer greatly, decay of the organs, and disease of the parts about them, being a very common result. A due amount of exercise is necessary for the well-being of the teeth of children, as well as for those of adults; this they should have so soon as they are developed, and ever afterward.

The great amount of suffering and trouble occurring at the periods of dentition indicate clearly that there is something radically wrong.

Dentition is simply a physiological process, and should not occasion, under proper management and nutrition, more difficulty

and suffering, either local or general, than the development and growth of any other organ. This may seem a strong statement, in view of the fact that so many children die before two years of age, and fully one-half of these from diseases incident to or modified by dentition. Close observation and careful statistics will, however, fully warrant the statement. A remedy in this matter can be found only in a strict obedience to the laws of life and health.

The question has often been asked: What are the laws of health? They are often referred to as very obscure, and difficult of comprehension. The amount of effort and intelligence bestowed upon many other subjects would make these very plain and easily understood. It requires only ordinary common sense to understand that the body should be protected from excessive thermal changes, and that the functions of its various parts should be regularly and properly performed, and that there should be taken and used a sufficient amount of proper food, and that pure air is an essential to good health.

Only a moderate degree of intelligence is necessary in order to understand that the principal eliminating organs of the body—the skin, the lungs, the kidneys, the liver, and the intestines—should be so cared for, and protected from injury, that they may perform their functions properly.

The skin, by uncleanness or diminished temperature, may fail to eliminate from the body its proper share of waste material, when the whole body will suffer. One of the important elements in taking cold, as it is commonly expressed, is found in this failure of skin elimination; the debris that should be cast out is retained, and finds its way back into the blood, and, in some degree, poisons the very fountain of life.

The same principle applies to all of the other eliminating organs and processes.

The digestive organs are perhaps to a greater extent, and more persistently, maltreated than any other organ of the body. Food possessing little or no nutrient property is oftentimes freely taken, which is not only non-nutritious, but in more or less marked degree irritating and harmful; too often food is taken that is not acceptable to the economy beyond the region of the palate, and after that its presence is obnoxious. Normal hunger—the demand for nutrition—and not the sense of taste, should chiefly control in

the selection of food. Food should not be used simply because it is acceptable to the sense of taste. This is especially true of childhood and youth. It is an easy matter to learn what food is healthy and nourishing; even little boys and girls can learn this by experiment, if no other way. They should be made to feel responsible for the avoidance of food that would injure them.

Much importance is oftentimes attached to the local hygiene of the teeth and mouth; much stress is laid upon the use of the brush, the pick, the silk, the powders, the pastes, the washes, and the various cleansing resources; but it should be remembered that the oft-recurring and frequent demand for these things is evidence that something is radically wrong elsewhere, and the more rational course would be to strike at the root of the matter, rather than to nip off the bud from the outermost branches. It is well to clean the teeth, when they need it, as carefully as possible; but it would be far better if we would live in such harmony with the laws of health, that such purification of the outside of the platter would but seldom be required; it would be better to reach deeper than our teeth for our uncleanness.

The lungs are eliminating organs of great importance, and discharge a vast amount of poisonous material, and, in order that their work may be well accomplished, no poisonous or irritating material should be permitted to enter them from without; pure air is for them a necessity, and is sufficient; they must also be allowed free play and expansion to their utmost capacity. The three sets of organs mentioned may receive direct injury in a variety of ways. There are, however, two other organs, the functions of which are about as important as these, viz: the liver and kidneys. These are out of the reach of direct outside irritation and injury, and their functions are usually impaired only by the defective workings of the other eliminating organs. This fact emphasizes the importance of maintaining the good condition of the skin, lungs and digestive apparatus; upon the proper balance of the processes of waste and repair depends the whole matter of growth and development in all parts of the body, as well as the maintenance of health in the fully formed body.

Dr. Spalding: We live upon the sins of the people. If no physical sins were committed, there would be no occupation for dentists or doctors. I have not so much confidence in nutritive

remedies as I had some years ago. The lack of a sufficient supply of nutriment is not likely to be the chief cause of trouble in cases where the teeth, or the general system, suffer from imperfect development. The difficulty is more likely to be a lack of assimilative power. Young boys, and especially girls, are more likely to suffer in their teeth while at hard study than afterward, so much of nerve force being expended upon the brain as to leave too little for the assimilation of food.

It is the exhaustion of nerve force that induces sleep, the necessity for which becomes urgent in proportion as nervous exhaustion becomes sufficient to threaten the continuance of the involuntary forces which must be continuous in order to sustain life.

DR. BROPHY: The time will not come when the teeth will keep themselves clean enough to do without a tooth brush, but no coarse tooth powders should be used, that will wear them away, or cause the gums to recede by hard friction.

As to food, something should be said in favor of beef, which is one of the most nutritious and useful of all the various kinds of food that are easily obtainable, and is as important, as a regular article of diet, as the brown bread of which so much is justly said.

Physicians can do a great deal more than we can to promote a better understanding and observance of the laws of health, if they will only devote their attention and effort to that end, for they see a great many more people than we do, and see them oftener, and with better opportunity to observe whether they are living in constant violation of the laws of health. Hygiene is very broad. It relates to the care and management of the whole body, and to all the circumstances and habits of living.

There needs to be a long and well conducted series of experiments in institutions where there are many persons (especially young persons) living under similar conditions, before we can form any very plausible theory of the causes of caries of the teeth.

DR. W. H. BARKER, of Pella, Iowa: "One fact is worth a thousand theories." I am sorry to hear Dr. Black place himself in opposition to the "brown bread theory," for I am convinced

that it is not simply a theory, but a fact, and one of vast import to our patients. I am sorry, therefore, to see one who should lead in this matter take the wrong side of the question, and teach the same to those who look to us for instruction. One gentleman has said on this floor, "We can neither decide nor prove anything in this direction until the experiment is tried upon a class of individuals whose diet, for a long time, is limited to brown bread." The experiment has been tried and thoroughly proved, not on simply a class of people, but a whole nation, and for generations, too. I refer to the Scotch people. Their bread diet is almost exclusively oat-meal. They have proverbially fine teeth. As a class, in this country, they are poor subjects for dentists, for they do not need our services. Scotland is a poor field for the American dentist.

France, Germany, India and Japan, all have American dentists who have gotten to themselves wealth and fame; but who ever heard of an American dentist in Scotland? Why is this? Oat-meal answers the question. In my own practice, three-fourths of which is among foreigners of another nationality, a very different state of things exists. They are from a country where the food is almost devoid of phosphates, and the result is plainly seen in their dental organs. I see whole sets of teeth upon which but little enamel is to be found. The mouths are small, and the very worst cases of crowded dentures exist. Good teeth are the exception, very poor ones the rule. Their bodily and muscular development is far below that of the Scotch, and there are many cripples and deformed persons among them. As they lived in their native country on food of poor quality, their whole bodily development shows the effect. In muscle and bone they are not at all to be compared with the Scotch, whose diet is as simple, but is far richer in the phosphates. Comparisons like these may be invidious, but facts must not be ignored on that account. When it comes to the question of the effects of the phosphates in food, the Hollander must give way to the brawny Scot.

Dr. Black: For the last twenty years we have heard discussions of this subject, that have gone over about the same ground as this one has, and in about the same way; and I am very much surprised that little or no effort has ever been made to trace the *natural history* of caries of the teeth. If we seek to under-

stand a disease, for the purpose of either cure or prevention, it is important to know its usual characteristics in ordinary cases, such as the age at which it oftenest makes its appearance; the usual symptoms and phenomena attending its progress; the course it usually runs; the extent and consequences of its ravages, if left to itself; the periods of comparative immunity, if there are any, etc., etc. Caries of the teeth is essentially a disease of youth. We get most of our practice from young people, and in many cases decay naturally ceases by thirty years of age. I believe that this fact accounts for many of the results that have been attributed to a brown bread diet. People whose teeth are decaying adopt a diet of brown bread, and after awhile find that decay has ceased, or is making slower progress, and attribute the change to the brown bread, when it may be the result of advancing age, or differences of habit in the care of the teeth, or the passing out of that particular epoch of decay, by the influence of more favorable conditions in other ways, and the brown bread have little or nothing to do with it. There are usually more phosphates in the food and drink in this lime-stone country, in which most of the drinking water is hard, than the system needs or knows what to do with, and we find it incrusted upon the teeth in the form of tartar, and forming calculi in the ducts and in the bladder, becoming a nuisance and an injury.

I have spoken strongly, because I wish to direct attention to the natural history of decay.

When we study Dental Hygiene effectively, in respect to caries, we must have numerous, long-continued and careful observations and records of the various circumstances and phenomena belonging to the natural history of the disease.

DR. SUTHERWOOD: I recommend to my patients brown bread without the *brown*. Millers now make patent process flour from the outside of the grain, which contains about all the phosphates, for they grind so close that the bran carries away hardly anything except woody fibre.

DR. TAYLOR: Physiologists and chemists say that the phosphates are in the outside of the grain, just beneath the bran, and the center of the kernel is nearly pure starch. We may get most of the phospates in patent process flour, but we need waste mate-

rial as well as nutriment in our food, to furnish bulk for distention, and stimulus of the digestive organs; and it may be doubtful whether the removal of the bran is wise, unless for persons of weak digestive powers.

Dr. Swain: I believe that most of the benefit derived from the brown bread diet is caused by the added bulk and coarseness of the food. Dr. Kulp changed the diet of his family from fine and concentrated food to that which was coarser. If a horse is fed on corn meal alone, it makes a small hard bolus in his stomach, acted upon with slowness and difficulty by the gastric juice, which is also deficient in quantity, from lack of the stimulus afforded by distention of the stomach, and if that diet is continued long, he will die, and he will become so ravenous for something to distend his stomach, that if he cannot get hay or straw he will eat leaves, or shavings, or saw-dust—almost anything that will fill him. We get phosphates enough in our ordinary variety of food, if we are plain livers.

FRACTURES OF THE INFERIOR MAXILLA.

BY DR. THOS. L. GILMER, QUINCY, ILL.

[Illustrated by Dr. G. V. Black, Jacksonville, Ill.]

In attempting to collect the material for a paper upon the treatment of fractures of the inferior maxilla, I found that part of our text books relating to this subject very incomplete. I also discovered that there was but little of a practical nature to be gleaned from works on surgery.

It appears to me that we are not so well informed as a profession, upon this particular branch of our calling, as upon others which daily demand our attention. This may be owing to the infrequency with which the majority of operators meet with such cases; but it is a very important branch of dentistry, and should engage the attention of every one in the practice. We are liable to be called upon at any time for the treatment of fractures of the maxillary bones, either in co-operation with the surgeon or alone.

It is conceded by the general surgeon that fractures of the lower jaw are among the most troublesome to treat, and that without

the aid of a skillful dentist the result is rarely what it should be. Fractures of the inferior maxilla are especially difficult of treatment: first, because of the inability to splint them in the same manner as other bones; second, because of the numerous muscular attachments, most of which, besides giving mobility to the jaw,

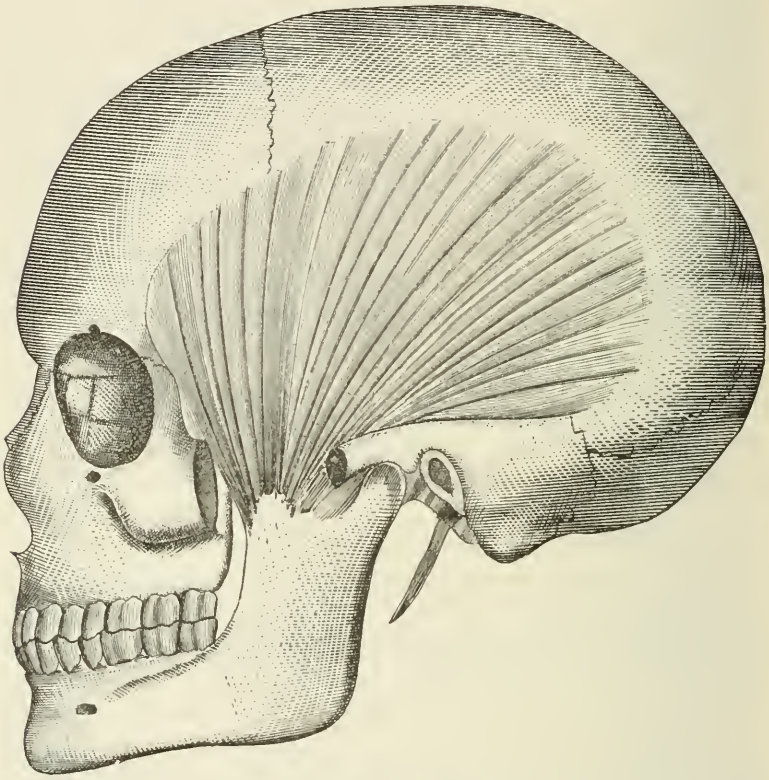


FIG. 1—TEMPORAL MUSCLE.

perform various other offices, thus giving rise to difficulties in treatment. In the treatment of a fracture of one of the lower limbs, the muscles upon which the limb depends for action are the only ones with the contractility of which the operator has to contend. This is not the case in fractures of the lower jaw. Besides the muscles which govern the movements of this particular member, we have the muscles which govern the tongue, the larynx, the pharynx

and the neck, all tending to displace the fragments, as they perform their respective functions. It is therefore necessary to take into consideration the action of these various muscles, when making an appliance for the purpose of holding the parts in their normal position and at rest, while nature unites the fragments. This being the case, a knowledge of the muscles of the jaw and its surroundings is essentially necessary to successful treatment.

ETIOLOGY.

In time of peace these fractures are mainly caused by kicks from animals, falls from heights upon the chin, and blows from

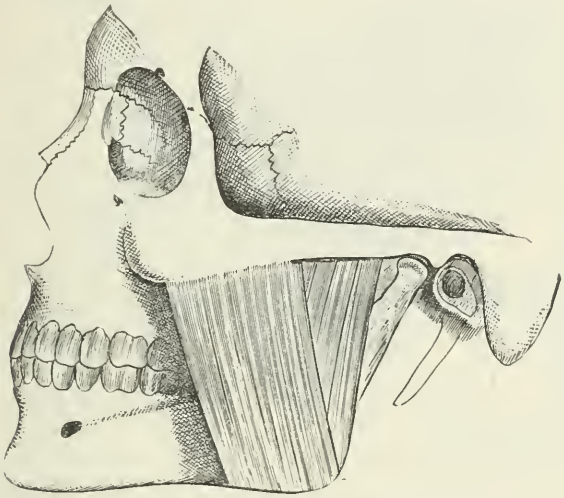


FIG. 2—MASSETER MUSCLE.

individuals. In time of war, gunshot wounds are a more common cause. As a rule these are said to be more difficult of treatment than those from other causes, from the fact of their being compound, and frequently comminuted, often with much loss of bone and laceration of soft tissues.

DIVISION.

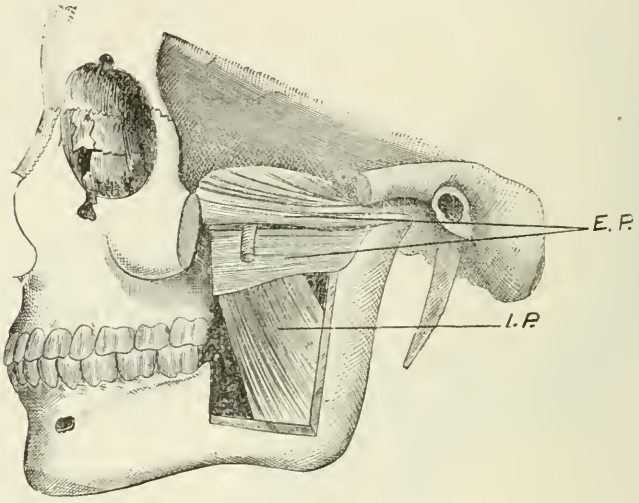
Fractures of the inferior maxilla may occur at any point between the condyles, including the coronoid process in its protected position, but are more commonly met with between the symphysis and angle.

As a rule dentists are employed only to treat cases which require an apparatus inside the mouth to hold the parts in position. When the break is at the angle or in the ramus it is more commonly attended by the surgeon alone.

SYMPTOMS.

As in similar injuries of other bones of the body, fractures of this bone are indicated by mobility, crepitus, and displacement. In

FIG. 3.



E P—External Pterygoid Muscle. *I P*—Internal Pterygoid Muscle.

addition to these symptoms, one tooth, or more, if present, may be loosened on the line of break. If the fracture be posterior to the median line, and anterior to the attachment of the masseter muscle, the obliquity being favorable, displacement is easily discernible. There is also more or less pain, and in some cases a considerable increase in the flow from the salivary glands.

DISPLACEMENT.

Displacement is produced primarily by the force which caused the accident; secondarily, (and generally much more decidedly), by muscular contraction. Muscular contraction is usually very pronounced, yet there are cases in which this influence is not felt. If the fracture be at the median line there will be little or no displacement consequent thereupon, as the muscles of the one side have no

advantage over those of the other; but if it be posterior to this point it becomes greater until the attachment of the masseter muscle is reached, when displacement from muscular contraction decreases. The muscles which are the most active in causing displacement are the masseter, the internal-pterygoid, the mylo-hyoid, the genio-hyoid, and the genio-hyoglossus. (Figs. 2, 4, 8, 9, 10.)

If we have a single fracture at or near the cuspid tooth, the masseter (being stronger than all the others which it opposes

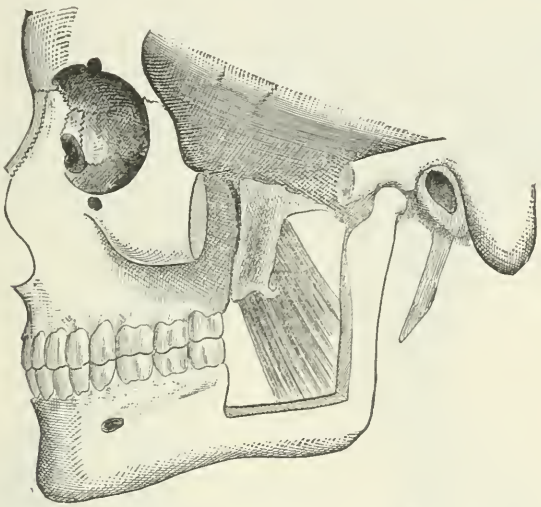


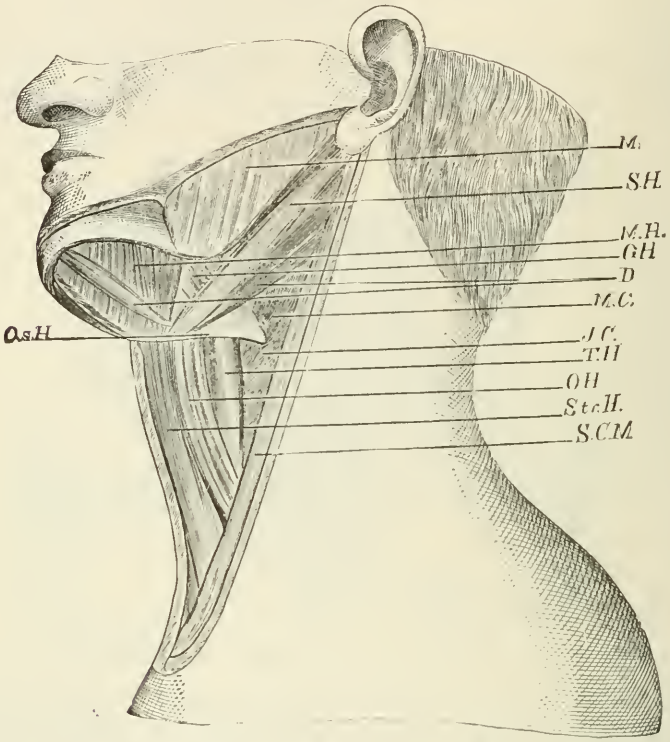
FIG. 4—INTERNAL PTERYGOID MUSCLE.

combined), by contraction will elevate the posterior fragment, and rotate its base outward, while the mylo-hyoid, assisted by the internal pterygoid, will draw the same fragment into or toward the center of the mouth (Figs. 2, 4, 8); at the same time the mylo-hyoid, the genio-hyoid and the genio-hyoglossus, aided by the internal-pterygoid of the opposite side from the fracture, will pull the longer fragment toward the fractured side, thereby increasing the displacement. (Figs. 8, 9, 10.)

Any decided movement of the head, either rotary or otherwise, will have a tendency to displace the fragments. The simple acts of deglutition and speaking also tend to do the same. In fact all the muscles, either directly or indirectly attached to the hyoid bone, will aid displacement. (Figs. 5, 6, 7, 10.) There are eleven pairs of muscles attached to this bone, four pairs of which

are directly attached to the lower jaw, viz: the digastric (by its pulley), the mylo-hyoid, the genio-hyoid and the genio-hyoglossus. Two other pairs of the eleven (the lingualis and the hyoglossus), are directly attached to the tongue, and must be taken into

FIG 5.



MUSCLES DEPRESSING THE LOWER JAW.

M—Masseter.
S H—Stylo-hyoid.
M H—Mylo-hyoid.
H G—Hyo glossus.
D—Digastric.
M C—Middle Constrictor.
I C—Inferior Constrictor.
T H—Thyro-hyoid.
O H—Omo-hyoid.
Str. H—Sterno-hyoid.
S C M—Sterno-cleido mastoid.
Os H—Os Hyoides.

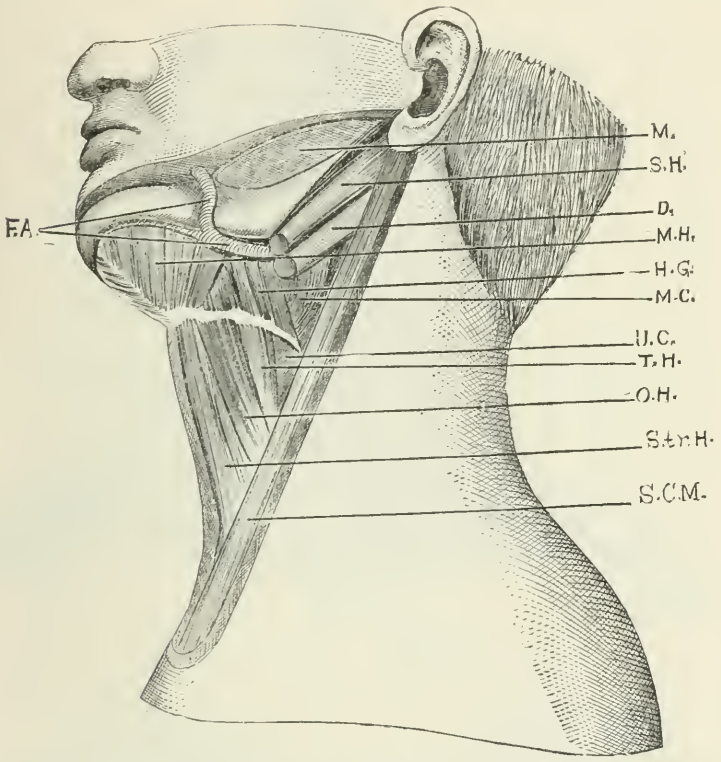
consideration, as, in performing their work they will aid in displacement.

In the act of swallowing, the larynx is elevated by the contraction of the hyoid muscles which are attached to the lower jaw and tongue. Before this contraction can take place the lower jaw must be fixed to the upper by the muscles which close the mouth, when the act may be accomplished. To convince your-

self that it is not an easy matter to swallow when the mouth is wide open, and the muscles consequently powerless, please try the experiment.

The necessary contraction of those muscles, in the act of swallowing, must (if the fragments are not restrained, either

FIG. 6.



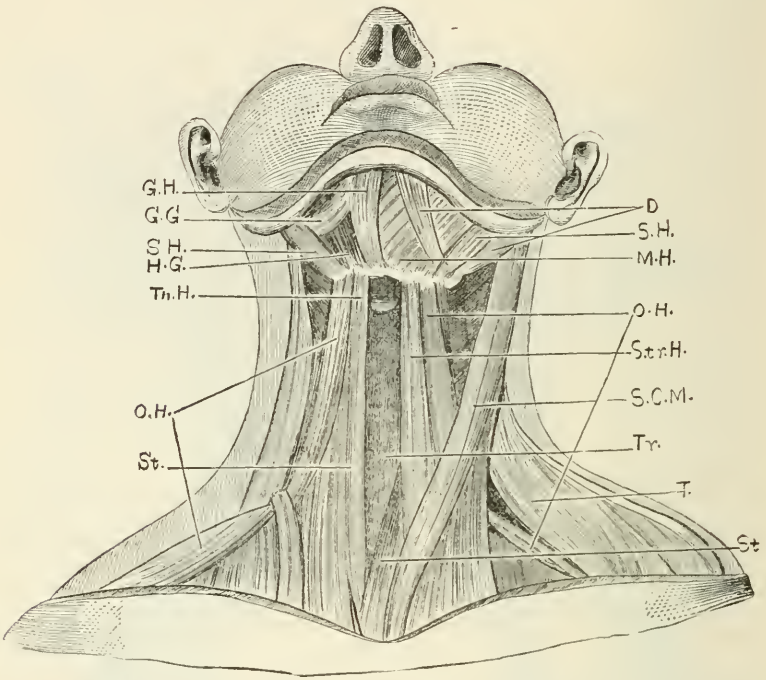
MUSCLES DEPRESSING THE LOWER JAW. DIGASTRIC AND STYLO-HYOID MUSCLES CUT AWAY.

M—Masseter Muscle.
S H—Stylo-hyoid.
F A—Facial Artery.
D—Digastric Muscle.
M H—Mylo-hyoid.
H G—Hyo-glossus.
M C—Middle Constrictor.
I C—Inferior Constrictor.
T H—Thyro-hyoid.
O H—Omo-hyoid.
Str. H—Sterno-hyoid.
S C M—Sterno-cleido mastoid.

by some mechanical apparatus or by the nature of the fracture), cause more or less displacement. If the head be thrown back, the same muscles being put on tension, will have the same tendency; if turned to the right or the left, the digastric muscle, aided by the

other muscles of the jaw, will produce a similar result. Not only the muscles directly attached to the jaw and tongue play a part in displacement, but all those with which they are related have a like tendency.

FIG. 7.



MUSCLES OF THE THROAT AND NECK.

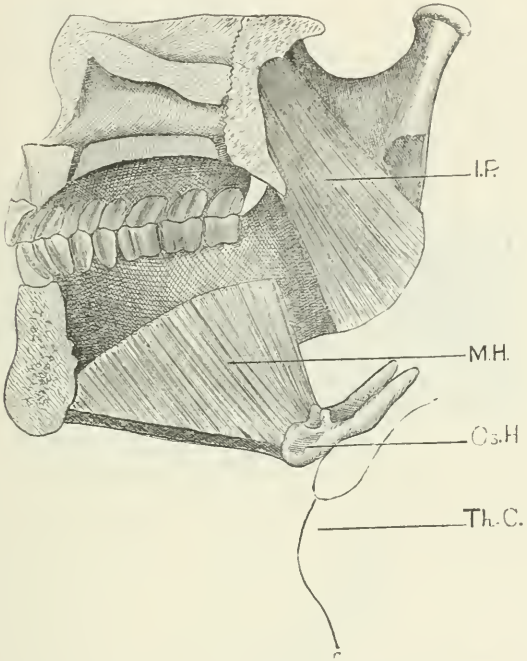
G H—Genio-hyoid.
G G—Genio-glossus
S H—Stylo-hyoid.
H G—Hyo-glossus.
Th. H—Thyro-hyoid.
O. H—Omo-hyoid.
St.—Sterno-thyroid.
D—Digastric.
M H—Mylo-hyoid.
Str. H—Sterno-hyoid.
S C M—Sterno cleido mastoid.
Tr.—Trachea.
T—Trapezius Muscle.

If the fracture be double, both breaks being near the cuspid teeth (one on each side), (Fig. 13) the displacement will be very decided, by the contraction of the genio-hyoid and the genio-hyo-glossus muscles, provided the line of break be favorable. (Figs. 7, 10.) These muscles have their attachment, as their names suggest, at the chin and hyoid bone, and would depress the anterior fragment and cant it outward, while the posterior fragments would be rotated outward at their base and elevated by the masseter,

(Fig. 2), and drawn in by the mylo-hyoid and the internal pterygoid (Fig. 8), making the displacement very great.

If the fracture be at a point midway between the anterior and posterior attachment of the masseter muscle, the displacement, if not complicated, is not commonly very great. If the fracture be at the angle, displacement is not very considerable. (Fig. 14.) The at-

FIG 8.



HALF OF UPPER AND LOWER JAWS SEEN FROM THE INSIDE.

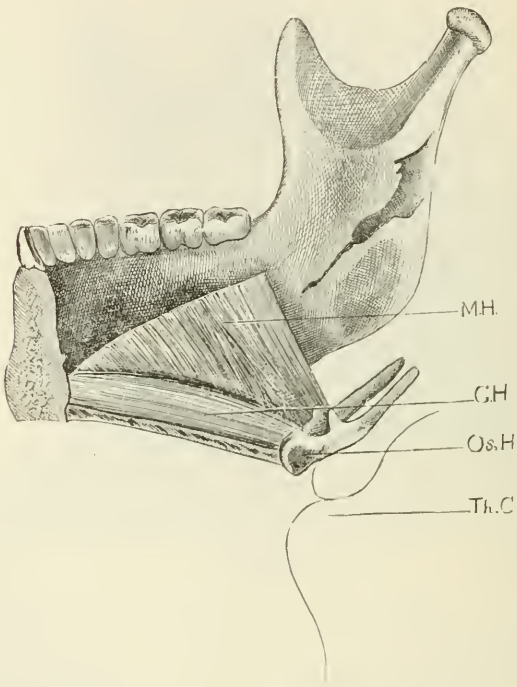
I P—Internal Pterygoid Muscle.
M H—Mylo-hyoid Muscle.
Os. H—Hyoid Bone.
Th. C—Thyroid Cartilage.

tachment of the masseter, extending to the angle, pulling directly up, and the external pterygoid, having its attachment posteriorly at the condyle, and anteriorly by one head, at the great ala of the sphenoid and the pterygoid ridge, the other at the external pterygoid plate, the tuberosity of the palate bone and the tuberosity of the superior maxillary, making its pull directly forward, tend to hold the fragments together. (Fig. 3.) Were these all the muscles attached to this portion of the jaw, displacement would not be serious; but unfortunately for such cases the temporal, having its

lower attachment to the coronoid process, by its posterior fibers, will tend strongly to draw the fragments apart, thus forming a V shaped opening. (Fig. 1.)

If the break be at the condyle, the external pterygoid will pull the short fragment forward, and the masseter, aided by the

FIG. 9.



LOWER JAW FROM INSIDE.

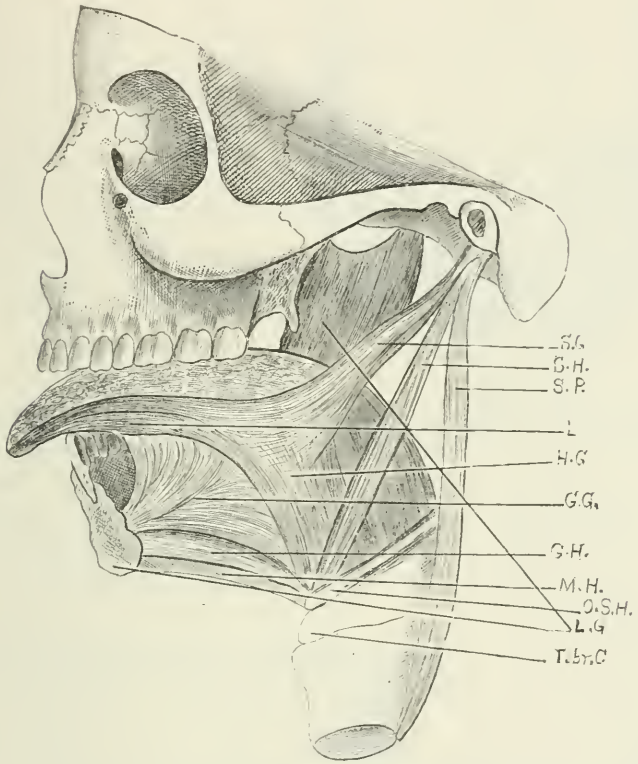
M H—Mylo-hyoid Muscle.
G H—Genio-hyoid Muscle.
Os. H—Hyoid Bone.
Th. C—Thyroid Cartilage.

temporal and the internal pterygoid, may, under some circumstances, cause the fragments to lap each other.

The line of fracture has a great deal to do with displacement in counteracting muscular contraction by the obliquity of the break. Should the fracture be double, as before described, the obliquity on each side being the same, that is: the line of break extending from below upward and backward, the contraction of

the muscles would have but little effect, since the anterior fragment would be firmly held in place by its extremities resting upon the ends of the two posterior fragments. Its upper surface may

FIG. 10.



THE TONGUE AND ASSOCIATE MUSCLES.

S G—Stylo-glossus.
S H—Sterno-hyoid.
S P—Stylo-pharyngeus.
L—Lingualis.
H G—Hyo-glossus.
G G—Genio-hyoglossus.
G H—Genio-hyoid.
M H—Mylo-hyoid.
Os H—Os Hyoides.
L J—Lower Jaw.
Th. C—Thyroid Cartilage.

be rotated outward by the contraction of the genio-hyoid and the genio-hyoglossus muscles, their attachment being nearer the base of the jaw than to its upper surface; but this displacement, if present, would probably be all there is from muscular action. But if the obliquity be the opposite from this, the anterior fragment would be displaced downward as in a similar fracture previously described.

If the obliquity on the left side be from below, upward and backward, while on the right side from below, upward and forward, the right end of the anterior fragment would be depressed by the muscles before referred to. The opposite side would not be displaced downward, from the fact of its end resting upon the oblique surface of the posterior fragment. This is equally true if the fracture be single and at the cuspid tooth, the obliquity extending from the outside of the bone forward to the lingual side In such a case the mylo-hyoid and the internal pterygoid would have full sway, and the displacement would be the same as before described, in the action of the muscles in a single fracture at this point. But if the obliquity be reversed, there would be no displacement inward by the mylo-hyoid, owing to the unfavorable angle of the obliquity for displacement. There would simply be an elevation, of the posterior fragment, and an outward rotation of its base by the masseter.

If this obliquity be found, it is safe to conclude that the blow which caused the fracture exerted its force anterior to the break; and it occasionally occurs that the blow is of such a nature as to drive the anterior fragment inward and backward, sufficiently to lodge it behind the posterior fragment, where it may be firmly held by the action of the mylo-hyoid, the genio-hyoid and the genio-hyoglossus muscles. A considerable force is often necessary to dislodge it.

So it will be seen that the obliquity may counteract muscular contraction, and very materially modify displacement consequent upon muscular action.

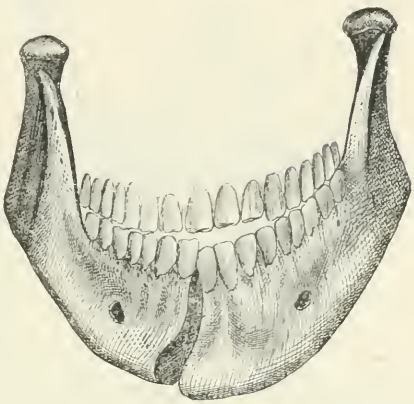
It has been said by some that the force or blow which causes the fracture has as much to do with displacement as muscular contraction, if not more. It is not easily understood how force alone can influence displacement, except by the overlapping and lodging of the anterior fragment behind the posterior, or by causing such an obliquity as to render it impossible for the muscles to exert their influence.

TREATMENT.

In early times these fractures probably perplexed the surgeon more than any others he was called to treat. Various methods were resorted to. Teeth, in those days, were not considered so essential to the comfort, health and good looks of the patient as

now. It was not considered of much importance if the contour of the face were marred by the poor adjustment of the fragments. If the parts grew together fairly well, it was of little consequence whether the articulation were entirely restored or not. If the posterior fragment *were* a little too high, and the teeth of this piece only, came in contact with those of the upper, the surgeon was not particularly disturbed; he knew full well what a regulator of irregular things Nature is, and hoped that, in some way, in the future the teeth on the one side might be depressed, and on the other elevated. The patient was thankful to get through alive, while the surgeon congratulated himself on having treated the case so successfully.

FIG. 11.

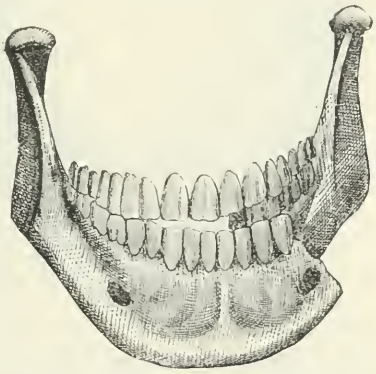


Fracture of the Lower Jaw between the Lateral and Central Incisor. Displacement slight.

It is different at present. When the jaw is well, the face must, if possible, have resumed its original contour; the teeth must articulate as before the accident; otherwise our patient has reason to be dissatisfied, and we are no better pleased than he.

It is only by examining the older authors, that one is able to comprehend the straits into which the surgeon was driven, in the treatment of these cases, until the practical dentist stepped in and helped him out of his dilemma.

FIG. 12.



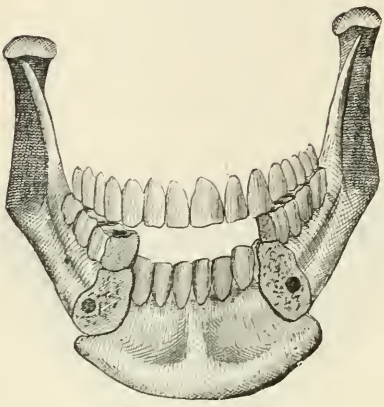
Fracture of the Lower Jaw between the Bicuspids, with displacement of the short fragment inwards.

LIGATURES.

The earliest treatment of these fractures in which ligatures were employed, is mentioned by

Hippocrates, in the fifth century B. C. The material of these ligatures was silk, linen, gold, and platinum; horse hairs were also suggested by Celsus.

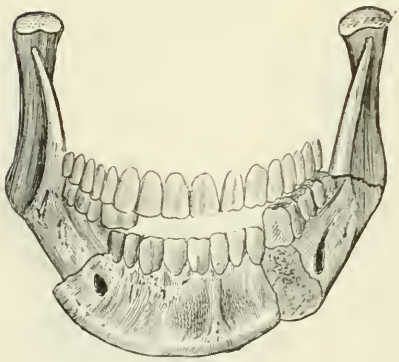
FIG. 13.



Double fracture of the Lower Jaw in the region of the Bicuspids, showing displacement of the Anterior Fragment downward and backward between and below the ends of the Posterior Fragments.

Metallic ligatures are still occasionally and advantageously employed. One reason why this form of treatment has not been more successful is owing to the fact that, in applying the ligatures, only one or two teeth on each side the fracture have been utilized in fastening the wire; while if this method be adopted, the more teeth the wire is secured to the better. If all are brought into use, beginning at the back tooth, and passing between the teeth, forming the figure eight in passing around them, there is greater certainty of success. If only a few are used in fastening the wire, the constant strain will loosen them in their sockets, and, even in the event of a union, the result will be an imperfect adaptation, and possibly the usefulness of the teeth employed will be destroyed. In all cases where muscular contraction displaces the fragments, and rigidly holds them out of place, this manner of wiring is contra-indicated.

FIG. 14.

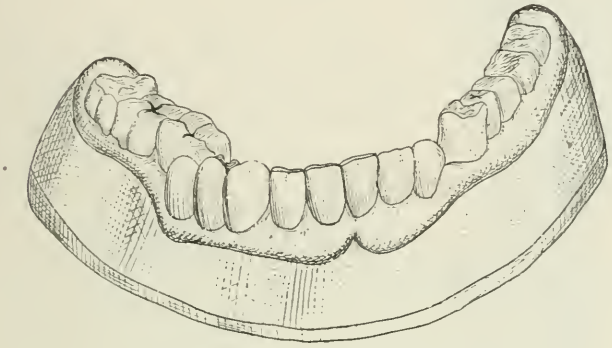


Triple fracture of the Lower Jaw, with one end of the anterior piece thrown outward and the other inward. Displacement is prevented at the angle of the jaw by the muscular attachments.

Other methods of wiring have been, and are still, very successfully employed. Holes may be drilled in each fragment, beginning on the outer surface, and meeting at the

fracture. (Fig. 36.) This can be done only in the circular or anterior portion of the jaw, and in many cases is quite difficult. Through these holes the wire is passed, a bead is placed on one

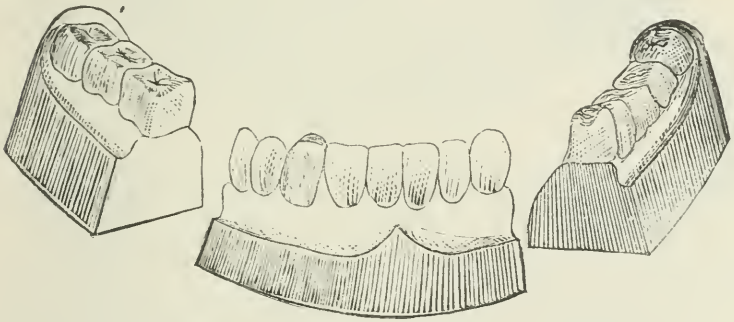
FIG. 15.



Cast from an impression of No. 14.

end, and fastened there by a lead; the parts are firmly brought together, and another bead placed on the other end and leaded. When the parts are properly brought together and firmly fastened, this method will give good results.

FIG. 16.

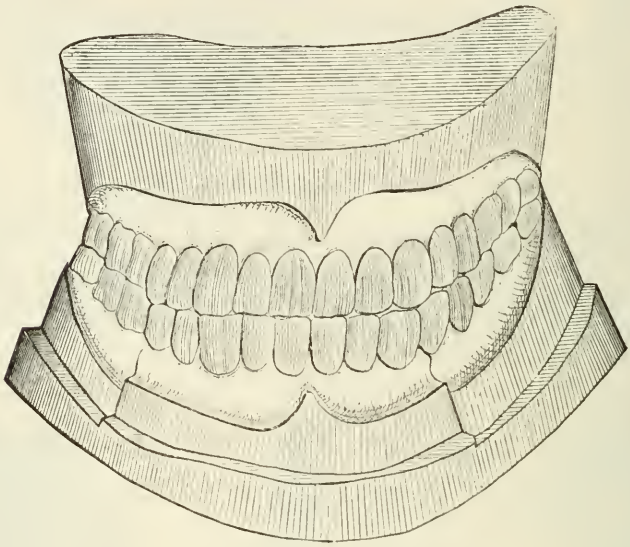


The cast (No. 15) cut apart at the points of fracture.

Another method is to drill a hole through on each side of the fracture and passing a wire through, draw the parts firmly together and twist them. (Fig. 37.) There is an objection to this method. Where it makes the turn, bending at right angles on the corners of the bone, the wire will cut, more or less, and loosening of the

fragments is almost certain to ensue. This might be overcome by using, instead of the ordinary size, much larger wires, sufficiently stiff to stand considerable strain without bending; and they might also be left sufficiently long to extend to the outside of the face, and the one securely wired to the other, both outside and inside the mouth. (Fig. 38.) Instead of tying the two inside ends of the rods, they might be secured to each other by a bar, extending from the one to the other, heads being formed on the rods to secure it. This will occupy less room in the

FIG. 17.



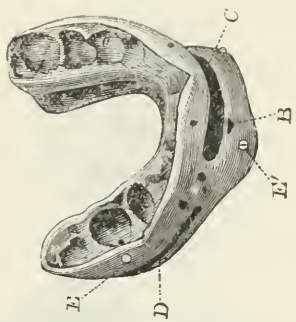
The cast (No. 15) reconstructed and in antagonization with cast of the Upper Jaw.

mouth, and will be a success if the holes can be drilled in the bar to match those drilled in the bone.

In the absence of natural or artificial teeth, the plan of tying the bones together with wires, is almost the only practical method of treatment. If the denture is complete, or if only a few of the teeth are missing, a wire splint may be formed, adapted to the teeth at their necks, the outer and inner pieces being made continuous by soldering. This is applied, and each tooth wired to the outer and inner parts of the splint. This makes a very

good appliance, which holds the parts firmly in place, and dispenses with outside arrangements. The cleanliness of this appliance, and the facility with which it allows the mouth to be cleansed, are additional arguments in its favor.

FIG. 18.

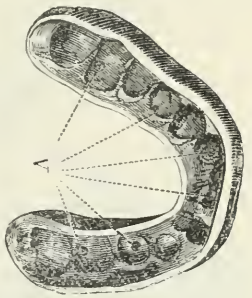


The original Gunning Splint;* screws added by which it may be secured to the teeth, thereby dispensing with outside appliances.

THE BANDAGE.

The bandage has been in use for ages, and up to the present time is the most general form of appliance. It is used alone and also in conjunction with other modes of treatment. It is superfluous, in this essay, to mention the many ways of applying the bandage in the treatment of these cases. By referring to any good work on surgery, all we know of them can be found, with one exception, which has been suggested to me by Dr. G. V. Black, of Jacksonville, Ills. He directs the application of it as follows: (Fig. 39.) Stand on the left side of the patient, and begin over the right ear; carry the roller low down behind the occiput, and forward above, but close down upon the left ear; continue across the forehead close down upon the brows, to the place of starting; continue as before to the occiput and to the left side; in crossing the left side with the second turn, carry the bandage high up on the head, and across the median line, with the front edge of the bandage a little back of the roots of the hair; pass down over the right temple, directly down the side of the face, to the lower jaw, and under it, well forward, and upward on the left side, until the bandage is crossed at the top of the head, down and backward, on the right side of the head, passing above the ear to the occiput, around to the left side, forward across the forehead to the right ear. This is continued until the

FIG. 19.

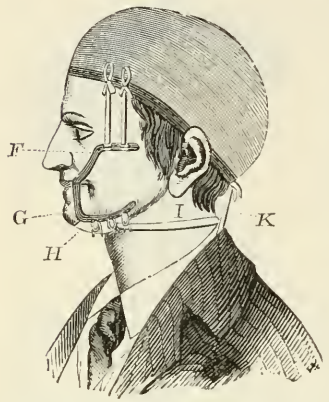


The same as Fig. 18, but without screws. To be secured in place as seen in Fig. 20.

* Cuts 18, 19, 20, and 21 were kindly loaned the Publishers by Dr. T. B. Gunning, for which I am under obligations.

number of layers is sufficient. Pin at the temples, at the top of the head, and at each side of the occiput.

FIG. 20.



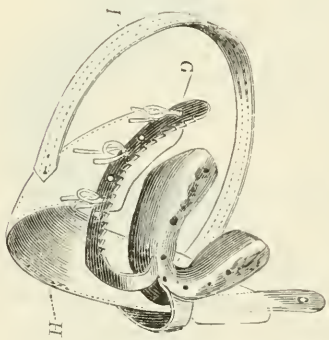
Splint (Fig. 19) applied, being held in place by the wing F, to which it is attached.

If thought best, a turn of the bandage may leave the occiput and pass below the left ear to the chin, around by the right side to the occiput again, and then on as before. This bandage may support any form of boot used on the chin. Experiment has shown us that this is a very superior form of bandage.

SPLINTS.

In the treatment of other fractures, one splint may be used for several similar cases, but not in fractures of the inferior maxilla, in which each splint must be formed for the particular case in hand. On account of the great variety in shape and size of the teeth and jaws of different subjects, the use of a universal splint is impracticable. Splints of various kinds have been employed for more than a century. The use of them was suggested by Desault and Chopart. In olden times surgeons placed watch springs on the lingual side of the teeth and tied them there with ligatures, by which they hoped to hold the parts in place. Grooved pieces of metal were sometimes placed over the teeth, across the break. Another method was to fasten a piece of metal on the buccal sides of the teeth, and by means of thumb-screws to pull the fragments into place, and hold them there. Various appliances, some very simple, others exceedingly complicated, were resorted to for the purpose of retaining the fragments in position; but upon the introduction of vulcanite

FIG. 21.



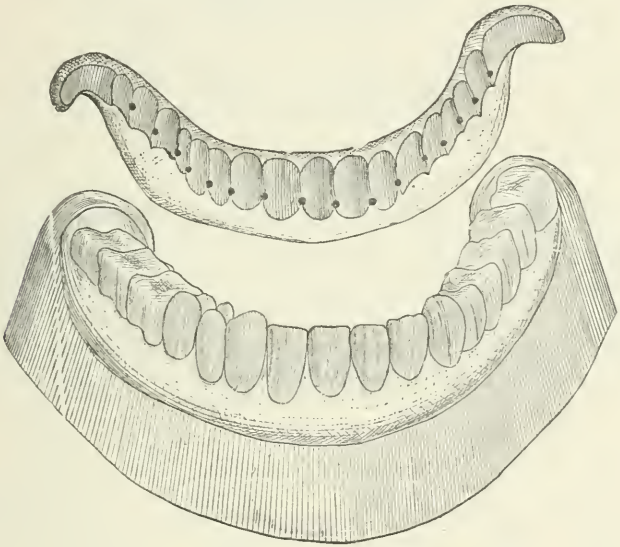
A late invention of Dr. Gunning; with this the jaw is free to move.

for this purpose, by Dr. T. B. Gunning, of New York, the older forms passed out of use.

IMPRESSIONS AND CASTS.

Preparatory to the formation of a splint, it is necessary to secure correct impressions of both upper and lower teeth and jaws. The upper may be taken in plaster alone, but the lower can be better and more accurately made by first taking in wax; from the inner surface of this, a small portion is cut away, a

FIG. 22.



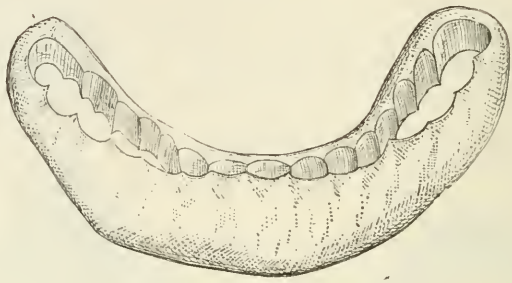
Posterior Band Splint with cast.

little plaster substituted in place of the wax removed, and the whole is replaced in the mouth. An impression thus secured (if well done) will be correct and sharp. By this means an impression cup of wax is produced, which fits the parts, and very materially simplifies the operation. The sharper these impressions, the greater the certainty of a true articulation after the union of the fragments.

The lower impression may be made either in sections or entire, according to the case in hand; of the comparative expediency of these two methods the operator must judge for himself. If the displacement be so great as to render it improbable that a

good impression may be secured in entirety, it is better to take it in sections. In taking the impression of the lower jaw, it is useless to attempt to hold the parts in position, since the setting of the bone will be done after the appliance is made, by its applica-

FIG. 23.

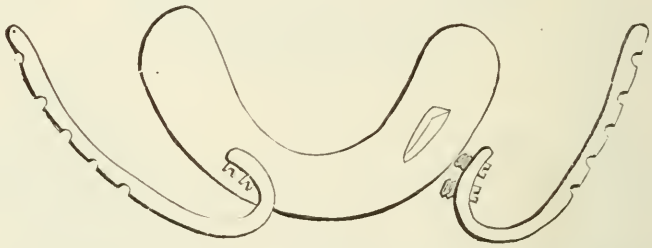


Open Band Splint.

tion to the teeth, or to the teeth and jaw; therefore, all time given this effort will be lost; besides, in the majority of cases it is impossible to hold the parts in position while the impression is secured.

From these impressions models are to be made. (Fig. 15.) If the impression has been secured in one piece, the cast from

FIG. 24.

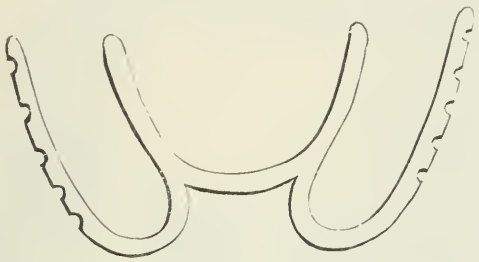


Interdental Splint of Rubber or Celluloid, with side arms attached by screws. The arms may be imbedded in the material, but the ordinary vulcanizer is too small to receive them.

it is to be sawed in two on a line with the fracture. (Fig. 16.) The teeth of these two pieces are then carefully articulated with those of the upper model. (Fig. 17.) This is easily done, even though several of the teeth of each jaw are missing; as

there is always an abraded surface of the teeth of one jaw, which exactly corresponds to that of the other; but the greatest care must be exercised in fitting the parts together, as success depends upon the correctness of this part of the

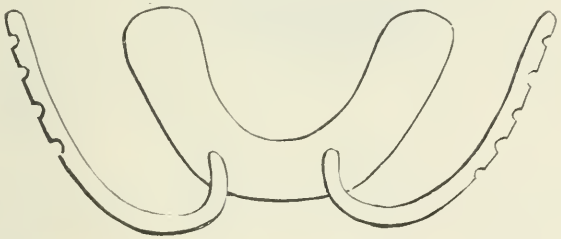
FIG. 25.



Wire frame for side arm interdental splint of gutta percha.

operation. If but the slightest difference is made in the articulation, failure of perfect adaptation is almost certain to ensue, as the fragments not being held squarely together, an undue pressure will be brought to bear on them at one point, while at another they will not touch; consequently, at that point where

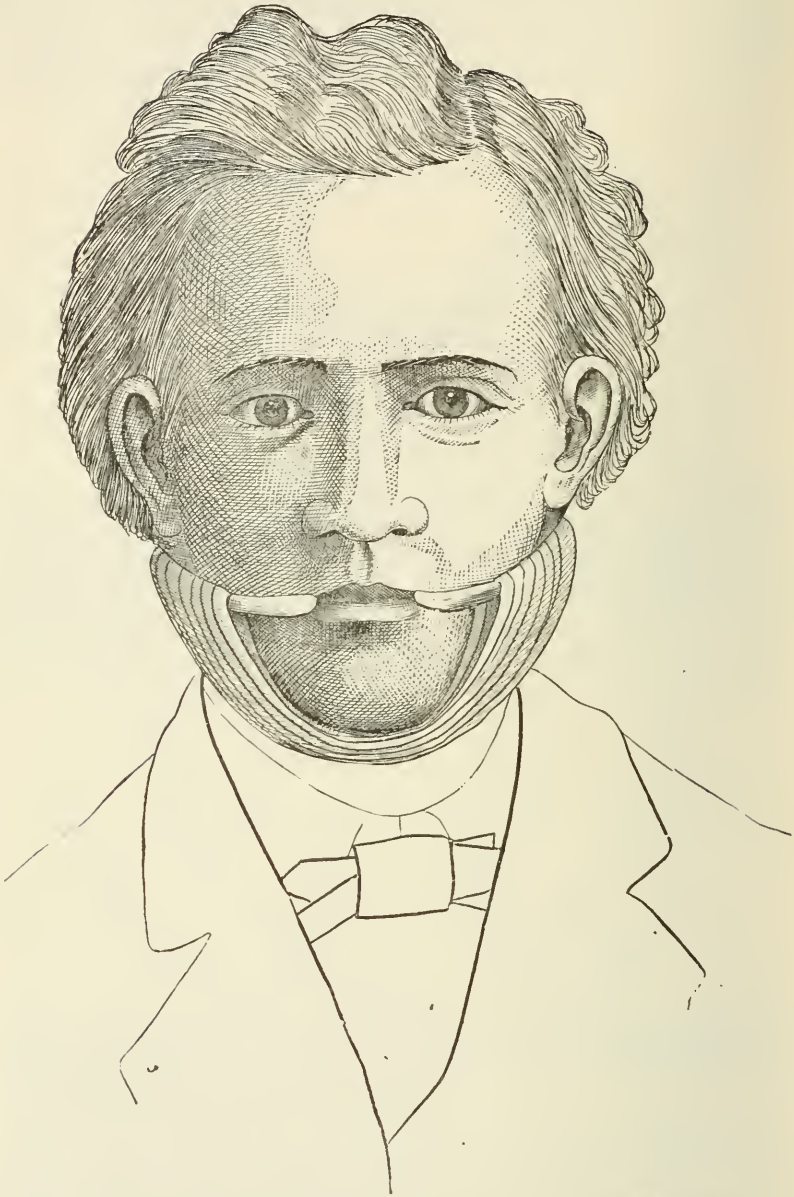
FIG. 26.



Gutta percha Splint, as made on wires (Fig. 25).

there is too great pressure, inflammation will set in and death of the bone will probably follow; union may take place, but if it does, the articulation will be faulty. When the articulation of the two pieces is made with the upper, those representing the lower broken jaw are to be united by the addition of a little soft plaster. If the work has been well done, this reconstructed model represents the jaw as it was previous to the accident. The foregoing description of impressions and models holds good, either

FIG. 27.

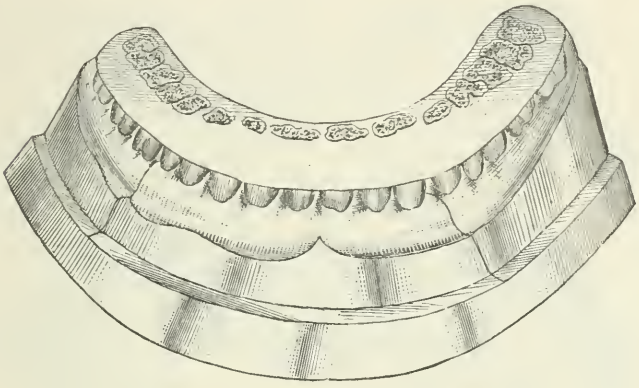


Side arm interdental Splint applied. A gutta percha or plaster paris boot may be used on the chin.

in single, double or triple fractures, unless the impressions have been taken in sections, in which case there are no divisions of casts to be made.

Dental splints are formed in various ways, according to the judgment of the operator and the case in hand. But those recommend themselves as preferable which are the most simple

FIG. 28.



Reconstructed cast (Figs. 15, 16, and 17) with interdental splint of gutta percha, in which a heavy wire is imbedded to give it sufficient strength.

of construction, and which take up least space in the mouth, having the requisite strength and other qualities which go toward making a splint serviceable.

GUNNING'S SPLINTS.

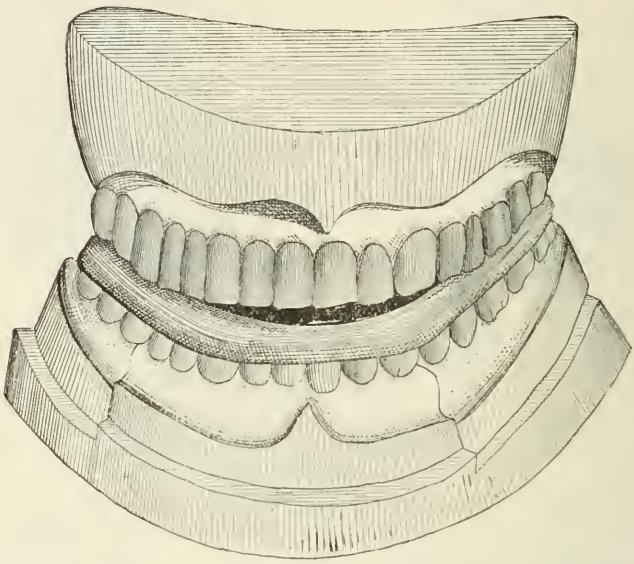
The first which we will notice by description is the original vulcanite splint, (Fig. 18) invented by Dr. Gunning, to which we have referred.

The lower reconstructed plaster jaw is adjusted to the upper, and the two models secured in an articulator, but I think (although Dr. Gunning does not suggest it) that before thus fastening them the face of the patient should be measured from the condyle to the middle of the upper jaw, and the middle of the upper cast placed in the articulator at the same distance from the joint of the articulator, as the median line of the upper jaw is from the condyle. This should be done so that in opening the bite to form the splint, (which is necessary in all forms of *inter*-dental splints),

the articulation may not be changed. The bite is only opened sufficiently to leave an aperture at the median line for the introduction of food, one-fourth of an inch being sufficient, and probably less may answer; the less the better.

A splint capping the upper and lower teeth is modeled in wax; the whole is placed in a flask and reproduced in vulcanite.

FIG. 29.



Splint (28) antagonized with the cast of the upper jaw. In this cut the splint is trimmed away in front so that food may be passed between it and the upper incisors.

The sockets in the splint should be slightly enlarged, so that the teeth will be certain to go readily into their respective places. This precaution should be observed in all forms of interdental splints formed on plaster casts, as there are generally little air bubbles in the plaster, which will fill with the material of which the splint is composed, rendering it an impossibility to get the teeth quite up into their respective sockets in the splint.

The splint is put into the mouth, and the fracture reduced by placing the lower teeth in position in the appliance. After they are in place, the upper teeth are brought into position by closing the mouth; a boot is fitted to the chin, and the jaws are securely bandaged together.

In any splint where it is necessary to open the bite as much as with this, there is danger of destroying the articulation, notwithstanding every precaution.

A modified form of this splint is at present used by Dr. Gunning and others. It is made like the other, with the addition of projections at the corners of the mouth, to which wings of metal are secured. (Fig. 20.) The appliance is put into the mouth, the lower teeth are placed in their respective places in the splint, and there secured by a bandage extending under the chin, from the wing of one side to that of the other, supporting a boot fitted to the chin. The upper teeth are held in place by a skull cap attached to the upper portion of the wing.

If either of these forms be employed at all, the rubber should be cut away so that all the incisors, above and below, will come through into the aperture left for the passage of food; by this means the distance between the upper and lower teeth is lessened, and a better opportunity offered for examining the articulation.

FIG. 30.

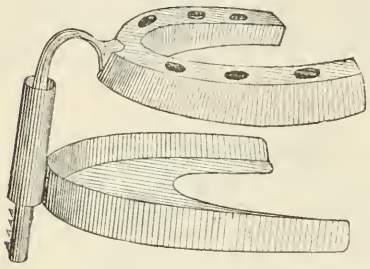
Splint (28) applied. Held in position by wires passed around each fragment of the bone.

This is the splint used in the celebrated case of Secretary Seward, where a non-union of one of the fractures resulted; but the case was exceptionally difficult, owing to the age of the patient, absence of natural teeth from the upper jaw, etc. Any other mode of treatment might have resulted equally unfavorably.

With this splint, as generally used, it is impossible to know whether all the teeth are entirely up in their sockets in the appliance, as the teeth of both jaws are fully covered; while the great bulk of material necessarily inside the mouth, together with the filthiness of such an appliance, speaks strongly against it, and we

are surprised that it is still in use. We say this with all due respect to Dr. Gunning; this being the original vulcanite splint, it was necessarily crude; but he deserves much credit, as all since made are but modifications of the original, and improvements upon it; besides, at present he is using, as well as the older form, one much superior. It is made to cover only the lower teeth, and is secured by means of the projections and wings as before described. (Fig. 21.) This is far superior to the older methods, as the mouth is not so widely opened, consequently there is less danger of changing the articulation; it is also less clumsy and more cleanly.

FIG. 31.



Black's Interdental Splint, with single arm

POSTERIOR BAND SPLINT.

The least complicated splint that I have seen, and one by means of which I have achieved success in the treatment of single fractures, is what (for want of a better name) we may call the Posterior Band Splint. (Fig. 22.) Although it does not permit the use of the jaw, as some others do, this splint has an advantage in its simplicity, and claims favorable notice from the fact that it allows the articulation to be seen at all times. The Posterior Band Splint is made by modeling the required shape in wax on the lingual side of the cast of the teeth and jaw, extending from the last tooth back on one side, to the last on the other, and from the grinding surface down on the jaw as low as a plate of teeth is usually allowed. It does not irritate the tissues like a set of teeth, as no pressure is brought to bear upon it downward, and muscular action does not interfere to cause inflammation, as the muscles are at rest, (or as nearly so as possible,) while the splint is held securely in place by being fastened to the teeth.

After being modeled it is reproduced in vulcanite, celluloid, or gutta-percha. If the latter is used, it must have a stout, steel wire in its body, as all gutta-percha splints should have, to give

sufficient stiffness. It is also necessary to imbed in its lingual surface a thin band of metal, as without this precaution wires used in securing it to the teeth would cut into the gutta-percha and become loosened. Gutta-percha is only admissible when lack of time prevents the use of either of the other materials, both of which, possessing greater stiffness, can be made more delicate, and are therefore preferable. When the piece is finished, holes are drilled into it so that it can be wired to a number of the teeth, or to all if thought necessary. The fracture is reduced by its application to the teeth and jaw, where it is securely fastened to the teeth by wiring. The jaws are brought together and held so by any suitable bandage. In a majority of cases, either by the loss of a tooth or space between the teeth, there will be sufficient room for the passage of liquid diet. But if no tooth be lost, or if the teeth be set so closely together as to preclude nourishment, (which we think will very rarely be the case), the bandage must be applied more loosely than otherwise, leaving the space of a line between the upper and lower teeth for this purpose. No fear of poor adjustment need be apprehended therefrom, as the teeth will be antagonized at all times, except when the patient is taking nourishment.

FIG. 32.

Black's Interdental Splint applied.

After a week, muscular contraction will be sufficiently overcome, and under favorable circumstances a soft union will have taken place, and although the splint be removed for a short time, the fragments are not liable to be again displaced; however, it is not advisable to remove it, but the bandage may be still more loosely worn, and liquid diet changed for semi-liquid.

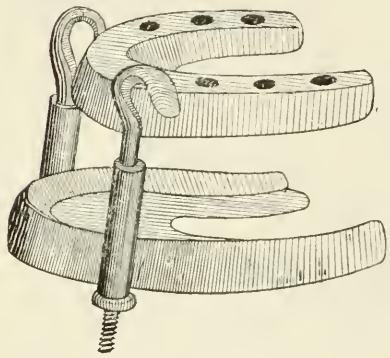
With this splint the articulation may be seen at any time after its application, and it may be ascertained whether it is correct or not, and if not, the work may be done over before it is too late. The teeth may be cleansed on their buccal surfaces at any

time, and on their grinding surfaces after a week or ten days, since after this period the bandage may be removed for a few minutes with entire safety.

OPEN BAND SPLINT.

When the fracture is double, both breaks being anterior to the rear tooth, and in single fractures, the Open Band Splint may be very satisfactorily employed in many cases. (Fig. 23.)

FIG. 33.



Black's Interdental Splint, with two arms instead of one.

Like the Posterior Band Splint, it is formed upon the reconstructed model, but in addition to the posterior plate there is an outer plate, which is made continuous with the inner, either by the same material or pieces of stout wire at its rear ends, and at any other point where there is sufficient space between the teeth. The splint is placed in the mouth, the teeth put in their respective places in the splint, the lower teeth closed against the upper, and the jaws bandaged together.

There are cases in which, owing to the articulation of the anterior teeth, this form of splint is not admissible; reference is had to those cases in which the upper anterior teeth overlap to such an extent as to leave no room on the labial surfaces of the lower teeth for the outer plate.

KINGSLEY'S SPLINT.

When there are two or more fractures in the body of the bone, the two splints last mentioned are not so well adapted as the one originated by Prof. Kingsley, of New York, (author of that most valuable work, "Oral Deformities." This work contains a few chapters on fractures of the lower jaw, which are the fullest and best extant on this subject. The dental profession is greatly indebted to him for this most valuable addition to its library.)

In making this splint (Figs. 24, 25, 26, 27) the casts are secured

in an articulator, the bite being only sufficiently opened to admit a thin layer of rubber between the teeth of the upper and lower jaws. It is modeled in wax, capping the lower teeth, extend-

FIG. 34.

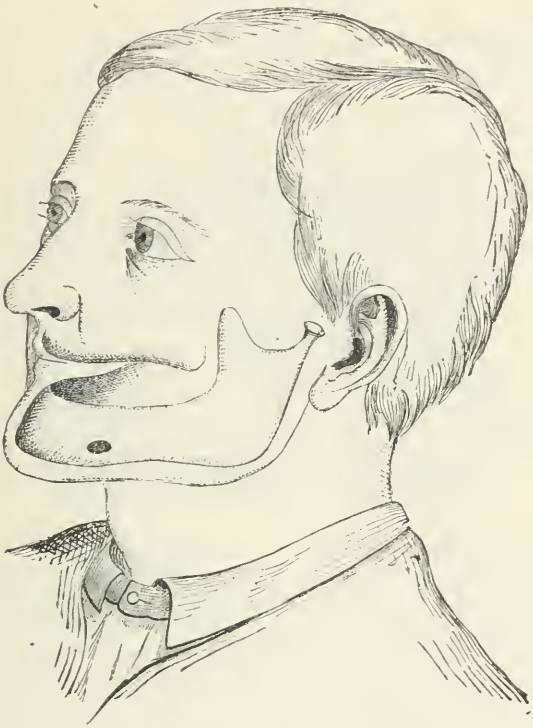


Illustration of the position of toothless jaws.

ing around, embracing the fracture or fractures, as the case may be, the upper surface being nicely adjusted to the superior teeth.

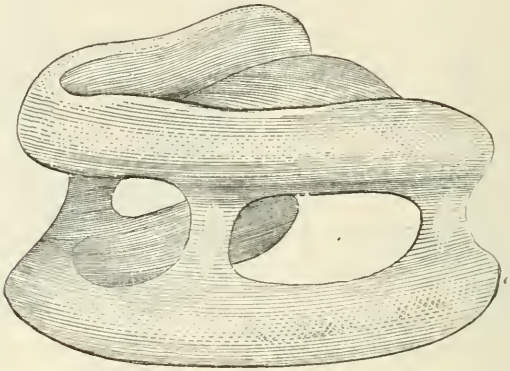
At or near the cuspid tooth on each side, heavy steel wires are imbedded in the rubber before it is vulcanized, or they are secured to it by screws or otherwise, after it is completed. These wires must be of sufficient length to allow of being bent up to clear the lip, and to extend backward on the outside of the mouth, running to the angle of the jaw, to receive an elastic or cloth band, reaching from the one to the other under the chin, and resting upon a gutta-percha boot fitted to the chin. If the elastic band is used it must be sufficiently strong to hold the teeth firmly up in their

respective sockets in the splint. After its application, the operator should see that the superior teeth are nicely articulated to the upper surface of the splint. With this splint soft food may be reasonably well masticated and the jaw is free to move; hence its advantages.

GRISWOLD SPLINT.

In the Missouri Dental Journal, for July, 1872, Dr. Griswold, of Leavenworth, Kansas, reported the treatment of a case in

FIG. 35.



A support for toothless jaws. A set of teeth that have been worn may be wired together and used for this purpose.

which he used a splint very similar to this. The splint was made of vulcanite, capping the lower teeth. An impression of the face under the chin was secured, from which a gutta-percha splint was formed, having two projections, one at each side; through these, holes were drilled sufficiently large to admit the passage of No. 13 wire; threads were cut on one end of these wires for thumb screws, while the other end was bent to fit into holes drilled into the splint for their reception. The inner and outer splints were put in position, and there secured by the wires and screws. He also fastened to the outer splint two cloth or leathern bands, extending from each side of the mouth to the occiput, and there fastened to each other by a buckle. I have never used this form of splint, but if properly made, it will doubtless be useful in many cases.

INTERDENTAL SPLINT WIRED AROUND THE BONE.

In compound fractures, when the external wounds are serious, and free drainage essential, a splint, independent of outside ad-

junets, is very desirable. Such a splint may be formed of gutta percha or vulcanite, and secured by wiring around the bone. (Figs. 28, 29, 30.) The splint is made by capping the lower teeth,

FIG. 36.

Illustrates a plan of wiring a fracture by passing a wire through holes drilled through the ends of the bone and securing it by beads and lead. This can only be used in positions in which a drill can be passed directly across the line of fracture and brought to the surface, as in the curve of the bone about the chin.

and is adjusted to the upper on its superior surface. A threaded needle, with the eye in the point, adapted to the work, is started in close to the fracture on the lingual side of the jaw, near the duplicature of the mucous membrane, carried down as closely as possible to the bone, and curving under it, is brought out on the face below. A loop of its thread is secured, opened sufficiently,

and the looped ends of two stout threads passed through it. The needle, with its thread, is then withdrawn, and the looped ends of the ligatures pulled through. The needle is now inserted on the face, in the hole previously made, following the ligature until the bone is again reached; then changing the direc-

FIG. 37.

In this case holes are drilled through near the end of each fragment, and a wire passed through each, brought together and twisted. This may be used anywhere in the body of the bone.

tion of the needle, it is made to follow the outer or buccal side of the bone upward, entering the buccal cavity. A loop of the thread is again secured, and the loop of a pilot thread passed through. The needle, with its thread, is now withdrawn, and a loop of the pilot thread brought through with it. We have now a pilot thread in the last opening made by the needle; through its loop we pass the free ends of the ligature introduced in the first needle hole; now, by withdrawing this

pilot thread, the free ends of the ligature are drawn through needle hole No. 2, and around the bone. Now we have two double threads around the bone. The loop of one of these is used to draw in a stout silver or platinum wire. This process is repeated until we have two wires, and with them, ligatures around each fragment. The splint is applied to

FIG. 38.

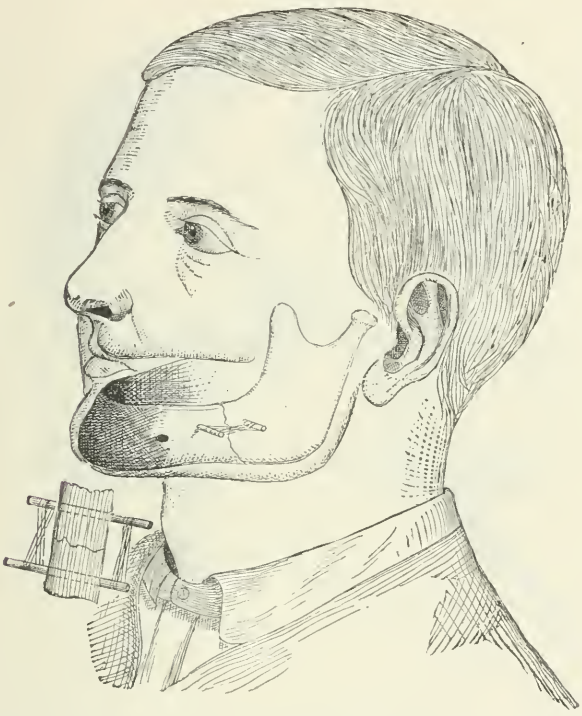


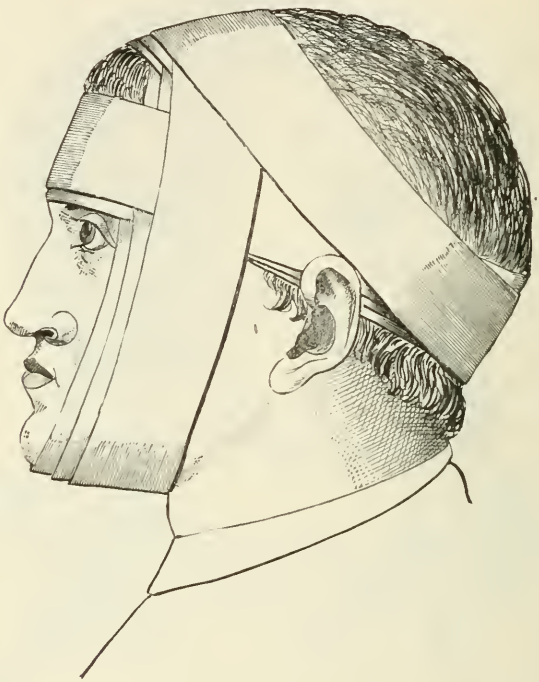
Illustration of a method of forming a stitch by drilling holes near the fracture in each fragment and passing stiff wires of suitable length through. These are held together by wrapping wire or thread from one to the other. The outer ends may extend out through the tissues upon the face.

the teeth, which are firmly drawn up into their places by the threads being brought together over the top of the splint and tied so that they will receive a lever by which they may be twisted, thereby forcing the teeth firmly and securely into their places. This being done, the wires are brought together over the top of the splint and fastened, when the threads having served their

purpose, are removed. The upper surface is adjusted to the superior teeth. The patient will masticate very well on such a splint. In the application of the ligatures, care must be taken to avoid the facial artery.

This splint, although requiring a little more knowledge of surgery for its application, is not so difficult to adjust as it might

FIG. 39.



Bandage above described.

seem. In those cases to which it is adapted, I consider this method of treatment superior to all others.

The method of wiring around the bone was first suggested and successfully used by Dr. G. V. Black, Jacksonville, Illinois.

BLACK'S SPLINT.

Dr. Black has suggested to me the following mode of treatment in single fractures, where displacement is present only to a slight extent, and the fragments not so rigidly held out of place

as to prevent the easy adjustment of the parts. He does not expect this treatment to take the place of that class of splints in use which can be made more delicate, and which from this fact are more cleanly, therefore preferable; but it is applicable to that class of patients who cannot appreciate, or are unable to pay for an appliance requiring a skillful operator to make and adjust

FIG. 40.

Bandage.

it. Such an appliance approaches more nearly to a universal splint than any other with which I am acquainted. He suggests that an instrument similar to the tongue holder used while operating upon the teeth in filling, be made in about three sizes, to accommodate the differently shaped jaws of different patients. (Fig. 31.) That portion of it inside the mouth should have the form of a lower impression cup, and be made of some suitable metal which can be changed in shape so that it may be easily adapted to the lower arch of teeth. That part under the chin

should be larger than the corresponding portion in the tongue holder, and more nearly the form of the chin. To secure greater stiffness the appliance may have two arms instead of one; (Fig. 33) in either case, they are fastened in the tubes or tube of the lower half by a ratchet or screw. The upper surface of the cup, which is used as a tray in taking the impression, should be flat, and the greater part of it cut away to permit the gutta-percha, which is used in conjunction with the splint, to flow through, so that it may be adjusted to the upper teeth. It is applied as follows: (Fig. 32.) The part resembling the impression cup is filled with warm gutta-percha, the fragments are firmly held in place, and an impression of the teeth is made; after which the lower part is covered with plaster or soft gutta-percha and applied to the chin; at the same time the arm of the upper part of the appliance is placed in the tube of the lower, and the chin piece pressed up until a perfect impression of the chin is secured. When the material is hard the appliance is removed and the redundant gutta-percha trimmed away; it is then placed in the mouth and the upper part of the splint secured to the lower by the ratchet or screw.

A skillful physician, remote from a competent dentist, might apply such a splint, and by its use obtain better results than are sometimes obtained by other methods. Great care must be exercised in its application when the impressions are being taken, as a poor adjustment of the fragments may cause direful results.

Dr. Black thinks it would be safer to take the impression of the teeth part from a plaster model of the jaw; but this would render its use impossible in the hands of the less skillful, as the taking of the impression and the construction of the cast requires more acquaintance with this kind of work than is usually possessed by the physician. I think it may be successfully used in cases where displacement *is* present, by taking the impression of the mouth part from a reconstructed cast, then adjusting it to the teeth and proceeding as before with the remainder of the operation.

TOOTHLESS CASES.

In the treatment of fractures of the lower jaw by splinting, when the mouth is toothless, (Fig. 34) I must confess I am not equal to the occasion, unless the patient have artificial teeth. If

the unfortunate has none, there is nothing to guide as to the articulation. In case there are artificial teeth, the upper and lower plates may be articulated and casts secured from them, upon which an *inter-maxillary* splint (Fig. 35) may be formed, similar to the Gunning splint, with that part of the appliance occupied by the teeth cut away, leaving connecting pieces on each side, both front and rear. By cutting this away there will be less material in the mouth, and the inner parts can be kept cleaner. The splint is held in place in the mouth by the skull cap, and by the band under the chin, the latter supporting a gutta-percha boot fitted to the chin. The skull cap and band are fastened, as before described in the Gunning splint, to the wings which are attached to the splint.

If the ridge on the lower jaw be sufficiently high, this method of treatment may work reasonably well; but if it be flat, as is usually the case with aged persons, it is hardly probable that a perfect adaptation of fragments will be had, and it is quite doubtful if anything in the nature of a splint will be of any use whatever. If there are no artificial teeth, or if the lower ridge is not sufficiently prominent, thus rendering any form of splint impracticable, the treatment in which the fragments are wired together, as before described, will be almost the only plan of holding the parts together.

Before applying any form of splint, the mouth should be thoroughly examined, and if loose teeth, roots or pieces of bone be present, which may hinder union, or endanger the life of the bone by their presence, they should be removed.

Inter-dental splints should have holes drilled in them in suitable places, that the teeth may be frequently cleansed with an antiseptic wash by the aid of a small syringe. Cleanliness is of imperative importance in all kinds of appliances.

In regard to the advantages of splints, we will quote from Prof. Kingsley's "Oral Deformities." He says, "Its advantages lie entirely in the skill with which the plaster jaw is reconstructed, and the accuracy with which the splint is made; for if either of these qualities be wanting, a splint of this form (meaning his splint, but the statement is applicable to all splints in which the cast is reconstructed) is of no more value than gutta-percha or a more imperfect method, and may even do positive harm. I fancy that it is because inter-dental splints have been so bunglingly

made and applied, that they have met with no more favor with certain eminent surgeons who have tried them."

There is very much more which might be added to this paper that would increase its value, but to do justice to the subject would render it necessary to give it more time than I can afford. It would also make the essay too long to be read before a society.

DISCUSSION.

DR. BLACK: I wish to call attention still more strongly to cases of compound fractures, especially those in which we find the lower jaw broken into three or four pieces, and the soft parts badly bruised, cut or lacerated. Here we have a serious task before us; yet these cases can be treated successfully, the contour of the face, and the antagonization of the teeth, restored. But they are the most difficult of fractures to reduce, and retain in position.

The reconstruction of the model, as described in the paper, should be well understood by us all, for any one of us may be called upon to do it.

Take this case: The lower jaw broken in three places—four pieces—away in the country where we cannot run back to our own, nor reach the office of a brother dentist; patient very fleshy, badly cut and bruised; parts very much swollen, so that the application of anything like a boot to the chin is out of the question. Here we have an ugly thing. We have had to treat just this case. Knowing nothing more than that there was a fracture of the lower jaw, we packed such things as we thought we might need into our satchel, and upon arrival found all the ugliness above described. After consultation with surgeons in attendance, a course was determined upon.

An impression of the lower jaw was obtained, and the cast reconstructed as described in the paper, except that all but one of the upper teeth were knocked out by the accident, complicating the reconstruction of the model. Measurements and the eye had, therefore, to take the place of the worn surfaces of the upper teeth as a means to determine the position of the fragments. An impression of the fragments, or rather of the teeth in the fragments, was obtained, a cast made, and cut apart at the points of fracture. Then the best possible approximation to the proper

width of the posterior jaw was arrived at by measurements, and the pieces of the cast formed into a symmetrical whole, waxed together, and secured by the addition of more plaster. A heavy iron wire was found about the house, and bent in such form that it would lie upon the grinding and cutting surfaces of the teeth, and cut to the proper length. Hot water having been prepared, a sheet of ordinary gutta-percha (for trial plates) was moulded to the cast, as perfectly as possible with the fingers. The wire was now warmed, and laid upon this, and another softened piece of gutta-percha quickly moulded over it, and firmly welded to the first. The whole was removed from the cast and trimmed, and my splint was formed.

The next step was the introduction of the threads and wires around the fragments of the jaw, as described in the paper by Dr. Gilmer, with the needles shown. Two of these were placed around each fragment, leaving the ends long, and so secured as to be as much out of the way of further operations as possible, and to prevent entanglements. Now the adjustment of the splint, and with it the reduction of the fracture, was begun. First, the teeth of one of the posterior fragments were forced into their places in the splint, and held by tying the *threads* over it. When thus secured, a second piece was pushed into its place, and in like manner secured with the threads. The reduction was thus continued until all the fragments were in place, and secured by the threads, examined, and found to be about the right thing. Then the threads were drawn very tight, by wrapping them around a small instrument, the end of which rested upon the splint; and while so held the *wires* were drawn tight, and secured by twisting one after another, until these, also, were all secured.

Now the threads, having served their purpose, were removed, and the operation upon the fractures was complete. The wounds of the soft parts then received proper attention, and such bandage as was practicable in the case applied, giving some little support to the parts.

The result was perfect union of the fragments, and the only deformity noticeable after recovery was the scars from the lacerations of the face.

This plan of treatment is not at all necessary for ordinary fractures, but for these extreme cases I unhesitatingly recommend it. The only point of danger is in wounding the facial artery

with the needle. The needle may be passed between the artery and the bone, or it may be so passed as to include the artery between the thread and the bone.

DR. MORRISON: Have you ever seen any necrosis at the points where the wire sutures impinge upon the bone?

DR. BLACK: I have not. I agree with Dr. Gilmer as to the value of the posterior band splint. I have made them of rubber, celluloid, and metal, and they have never failed to accomplish good results. I also think very favorably of the universal splint shown. In using it, the gutta-percha impression taken in the mouth part should be removed and examined (after it has remained long enough to be thoroughly hardened.) If this is right, it only needs to be reapplied. If it is not right, if the parts have not been held in position, a model must be made and reconstructed as in other cases, and a new impression secured in the splint from this, thus perfecting the splint. I have an impression of my own lower teeth in this splint [placing it in position, and speaking with it in his mouth.] You will find that when the teeth are forced into a gutta-percha impression they are held very firmly. Now we fill the chin piece either with softened gutta-percha or with plaster paris, and, passing its cylinder over the stem of the mouth part, press it up on the chin. If the posterior fragments are long enough to keep it from tipping down in front, it will hold the fractured parts perfectly.

If not, it will need the aid of a bandage, or some other form of splint should be used. This splint may be used in all single fractures in the body of the bone, except wounds of the soft parts prevent the application of the chin piece. The greatest objection to it is that it is necessarily bulky; but you will see, from the way I speak with it applied, that this is no great objection.

DR. BROPHY: I once had some experience with a non-uniting fracture of the under jaw. The broken surfaces were exposed and scraped, after which it progressed favorably.

Food may sometimes be passed by means of a bent tube, around behind the last teeth, and so the teeth of the two jaws be held firmly in a close articulation, which affords greater certainty of entire accuracy in the adjustment of the broken pieces of the jaw.

DEVELOPMENT OF THE ENAMEL.

BY DR. M. S. DEAN, OF CHICAGO.

While the epithelial nature of the enamel has become a settled question, the *mode* of its production is still a matter of controversy. Indeed, physiologists are pretty evenly divided as to whether the enamel-cells are actually *converted* into enamel-prisms, or whether the enamel is the *product* of these cells.

On the one hand we have Schwann, Tomes, Waldeyer, Frey, and others, who hold that the enamel is formed by an actual conversion of the enamel-cells (Tomes)—or, in other words—that the enamel may be regarded as the *petrified* dental epithelium (Waldeyer.)

On the other hand we have Huxly, Lent, Kölliker, Magitot, Kollmann, and many others, who believe the enamel to be the product of a secretion or an *exudation* of the enamel-cells.

Although the advocates of the latter theory do not perfectly agree as to the manner in which this *exudation* or *secretion* takes place, yet in this there seems to be no very *essential* difference.

Huxly claims the existence of a preformative membrane, which clothes the free surface of the internal epithelium. This, according to his theory, lies between the enamel-organ and the dentine-germ *until* the formation of the enamel commences; but afterwards *between* the enamel-cells and the forming enamel, so that in any stage of development this membrane may be raised from the external surface of the new enamel; and finally, after the enamel is completed, this membrane becomes the *cuticula dentis*, or Nasmyth's membrane.

Histologically, it seems to me that Dr. Magitot's description may be made to harmonize perfectly with the above; though he believes the *continuity* of this membrane is effected by artificial means.

He asserts that the basal extremity of the enamel-cells, *i. e.*, the ends that are presented to the dentine-germ, are closed by individual membranous *opercula:* that the opercula may be stripped off from the ends of each one of these cells. But, that in some preparations which have been affected by reagents, a ribbon can be detached from a row of these cells which is composed of several of these opercula united together so as to *apparently* form a

continuous membrane. This would, of course, conform to Huxly's *membrana præformativa*. Now, as to the formation of the enamel, Dr. Magitot says: The enamel-prisms are formed directly from a sort of *exudation* produced by each cell, which passes through the little opercule that closes or covers its extremity. The calcification of this exudation takes place upon the dentine-cap, and between it and the opercule. Each enamel-cell thus forms a complete prism.

From this it may be seen that these membranous opercula constantly intervene between the forming enamel and the enamel-cells, and might be raised from the surface of the former as a continuous membrane by the action of reagents. So I see no conflict in the histological descriptions of Huxly and Magitot, except that in one this membrane is naturally *continuous*, and in the other it is *made so* by the artificial union of the many opercula.

If I understand the theory of Kölliker and his school correctly, it does not materially differ from the above. He considers the enamel the product of the secretion of the enamel-cells, which exudes from the basal extremities, each cell forming an enamel-prism. Kollmann is also in accord with these authors as to the enamel being a hardened excretion of the cells, and claims that the free extremities of these cells are invested with a membrane which afterwards becomes the *cuticula dentis*.

This is a brief and, I believe, a tolerably correct synopsis of the views entertained by a few of the leading histologists whose opinions upon this subject have been most prominent.

Tomes, father and son, ably defined their theory that the enamel-cells become calcified, and, though they admit that a membrane may be raised from the surface of the young enamel, they consider it purely an artificial product, and the result of the action of acids on the most recently calcified portions of the enamel-cells. The histological facts that they adduce in support of the artificial character of this membrane, if they are admitted, it seems to me, are conclusive, and fatal to the theory that a true membrane exists between the forming enamel and the enamel-cells. For if the enamel-cells that are removed from the developing enamel are correctly figured by these authors, *i. e.*, if long processes are drawn out from the axial portion of the calcifying prism; and if the membrane which may be raised from the devel-

oping enamel is regularly perforated with holes corresponding to the enamel-prisms; and if, again, a horizontal section taken from the forming enamel after the cells have been removed, present a foraminated appearance; if all these are established histological facts, and I am not aware that they are disputed, then it seems to me that of the two theories, the actual conversion of the cells by calcification into enamel, is far the best supported by facts. It would appear to me that the whole question hinges upon the fact of whether this is a *true* or an *artificial* membrane, and until this is determined by chemico histology, the physiological phenomena that take place in the formation of the enamel must be conjectural.

But whether the enamel-cells are actually converted into enamel-prisms, or whether the latter are the calcified secretion of these cells, the question naturally arises, and the answer must be the same in *either case*, "Through what media are the lime salts obtained, of which the enamel is mainly composed?" This is an important physiological point, and one that is immediately connected with the question just discussed.

With the exception of Beale and Castanié, who claim to have found capillaries in the *Stratum Intermedium*, histologists, so far as I know, are either silent in regard to the presence of vessels in the enamel-organ, or they deny their existence altogether. Though this is *primarily* an anatomical question, it has also its physiological bearings on the development of the enamel. For, notwithstanding the general belief that the gelatinous mass, which forms the greater portion of the enamel-organ, filling up the interstices between the stellate cells, "has no more important function to perform than to fill up the space which is to be subsequently occupied by the growing tooth," it would seem to me *more than probable* that this proteine substance is a store-house of phosphate of lime, which stands ready to yield its supplies whenever called upon by the enamel-cells. This I believe would be in accordance with known chemical and physiological laws. This gelatinous or albuminous mass would, of course, receive fresh supplies of calcareous material from the rich plexus of vessels which surround the enamel-organ. But it would always hold a supply in *reserve*, which might be drawn upon in case the external sources should be temporarily interrupted by exanthematous affections, or other causes.

Gentlemen, knowing your partiality for short papers, I have tried to comply with your wishes. If you are not tired of this subject, I will, during the discussion, attempt to explain the subject more fully, by the aid of the pictures which hang upon the wall.

DISCUSSION.

DR. TAYLOR: Is the enamel nourished in any degree from the pulp?

DR. DEAN: Taking the question as it has been put, I would unhesitatingly answer it in the affirmative; *i. e.*, that the *formed* enamel is undoubtedly nourished, or at least its disintegration is in some degree held in check by the plasma from the dentinal pulp. But whether this is effected by a physiological or by a physical process is a question that I am not so ready to attempt to answer. That the dentinal pulp does not contribute anything to the *development* of the enamel, is most certain. The enamel, as has been shown, is entirely an epithelial product.

DR. BLACK: I do not know just what to say about this. It is intimately connected with other questions relating to development, and I am not certain whether I can make myself understood. I will try to answer Dr. Taylor's question. The paper directed attention to the basement membrane, which always underlies the epithelial tissues. The enamel and the dentine are therefore always separated by the basement membrane. The blood vessels, even the smallest capillaries, never pass this membrane. The epithelial tissues must therefore be wholly nourished by endosmotic circulation. The dentine is calcified from without inward, the external portion being hardened first, but the enamel is calcified from within outward, the *internal* portion first, so that if we suppose the forming enamel to receive its nourishment from the pulp, it has the hard layer of formed enamel (as well as dentine) between its supply of nourishment and the growing cells, and the transfer of nourishment in sufficient quantity would be impossible. The special provision for the nourishment of the forming enamel is in the interior of the enamel organ, which is filled with stellate cells, whose very large interspaces are filled with the fluid which furnishes the food to the ameloblasts out of which to build the enamel. This is the only place in which epithelial cells ever become stellate.

In the last five or six years I have spent a great deal of time in studying cancer, which is an erratic growth of epithelial tissue, yet it never penetrates beneath the basement membrane, and if the cancer cells stray away into the blood vessels, or lymphatics, and begin to develop a cancerous growth in a new place, the basement membrane is also developed about the growing group of cells, as it were dividing them from the connective tissue amidst which they grow. We have seen this exemplified in so many cases and so many diverse localities that we are satisfied of its constancy. These cells are thus hedged away from the connective tissue cells, and wandering into the surrounding tissues, or the blood or lymph streams, only occurs in case of the solution of this membrane by different portions of the erratic growth impinging upon each other, or breaks caused by motion operating upon the undurated tissue.

The common earth worm furnishes a ready means for studying the epithelial tissues with its basement membrane, under the microscope. The dermal epithelium cells are very large; several times larger than the columnar layer in man.

Dr. Taylor: Dr. Garrettson says that the enamel gets its supply of nourishment from the pulp vessels, and from the vessels of the periostium and cementum, and the apicial vessels.

I would like to ask Dr. Dean to tell what Nasmyth's membrane is?

Dr. Dean: This is a question that is closely allied to the development of the enamel, according to several authorities, and hence its discussion will not be inappropriate here. Nasmyth's membrane, or the *cuticula dentis*, is, I believe, an epithelial product—not a calcified one, as the enamel is—but cornified epithelium, like the nails. This is, I think, shown both by its chemistry and its histology. There is, however, a difference of opinion in regard to the origin of this tissue, and it is only fair that I give you your choice of the principal theories concerning it.

Waldeyer, Kölliker, and other German authors, are the main supporters of the theory that the *cuticula dentis* originates from the cells of the enamel organ; the first of these authors believing that, after the enamel is formed, the cells that constitute the external epithelium of the enamel organ, with a few additional cells of the *stratum intermedium*, become cornified and constitute

the Nasmyth membrane. He failed to find lime salts in its composition, and in burning, its odor was that of horn. Kölliker's theory differs from Waldeyer's in this: He says that when the enamel is completely formed, the internal epithelium (the ameloblasts), furnish another continuous layer, that envelops the whole.

Tomes, Magitot, Wedl, and others, consider it to be the continuation of the cement, a rudimentary osseous tissue; in which case it must be derived from the connective-tissue elements. The facts brought forward by Prof. Tomes strongly favor this theory. He finds lacunal cells in the thicker portions of this membrane, and believes it to be continuous with the cement.

Huxley, as has already been stated, believes the *cuticula dentis* to be a transformation of the *membrana præformativa*. To accept this theory, one must adopt his views regarding the development of the enamel.

These are the principal theories regarding the origin of this membrane, the parentage of which is disputed by the *epiblastic* and *mesoblastic* germ layers. I cannot give my reasons fully here for believing that it belongs to the former, but may attempt this some other time. Specimens of this cuticle may be most easily procured from the teeth of very young lambs.

DR. BLACK asked Dr. Brophy if the last edition of Gray's Anatomy was not incorrect and antiquated in what it says about the development of the teeth.

DR. BROPHY: I have said, and I believe, that Gray's Anatomy is the third book in the world (the Bible and Shakespeare taking precedence); but it does contain a number of errors, notably that one in regard to the anastomosis of the coronary arteries of the heart, and *all* that portion relating to the development of the teeth, is entirely untrue and misleading.

THE CHEMISTRY AND PHYSIOLOGICAL ACTION OF MERCURY AS USED IN AMALGAM FILLINGS.

BY E. S. TALBOT, M. D., D. D. S., OF CHICAGO.

The name Mercury was given by the ancients in honor of Mercurius, the messenger of the gods, whose volatile character mercury is supposed to typify. It is seldom found in the native

state, but is usually combined. The most important as well as the most abundant combination is the sulphide of mercury, or cinnabar. It is found united with silver, forming an amalgam. The largest and richest mines are found in California. The process of obtaining pure mercury from the sulphide is very simple. The ore is mixed with one-half its weight of lime, and then distilled in iron retorts. The mercury is extracted and the lime remains in the retort. It is a heavy fluid metal, odorless, tasteless, of a whitish color, and when free from other metals it does not tarnish, and its globules roll freely over white paper without leaving a streak or losing their form. It is liquid at ordinary temperatures. It boils at 662° F., and solidifies at —40° F. into a malleable mass of octahedral crystals. It is volatile at all temperatures, evaporation being much accelerated by the application of heat. The symbol is Hg, atomic weight 200. Mercury combines with other elements and radicals in two proportions. Those compounds in which the *lesser* acidulous radicals are united are termed mercurous. The higher mercuric—thus, calomel ($HgCl$) is mercurous chloride; while corrosive sublimate ($HgCl_2$) is mercuric chloride. Mercury combines with chlorine, iodine, bromine, lead, oxygen, phosphorus, sulphur, arsenic, bismuth, etc., forming compounds, some of which are used medicinally. The metal itself, rubbed up in confection of roses, licorice or suet until globules are not visible to the unaided eye, is used in medicine.

Amalgams were introduced into this country as fillings for decayed teeth in 1833. Since that time unlimited discussion has arisen among the general practitioners of medicine as well as the dentists, in regard to the practicability of utilizing this material in dentistry. The first amalgams were composed of pure silver and mercury, manufactured by M. Taveau. Later, Dr. Evans combined pure tin with a small quantity of cadmium, and Dr. Townsend formed an amalgam with four parts of silver to five parts of tin. Following these compositions came numerous others made from gold, silver, platinum and tin, until to-day we have more than a hundred varieties in the market, varying slightly in metals and proportions, that each manufacturer may rightly claim an original preparation. These different metals are melted in a crucible in their proper proportions by weight, and poured into ingots. These are filed or cut into minute particles, ready

for use. When the cavity in the tooth is prepared, a sufficient quantity of filings is rubbed up with mercury into a paste, the surplus mercury squeezed out, and the filling is inserted into the tooth.

From its first application as a filling the better class of dental practitioners waged war against it on general principles; not alone on account of the deleterious effects of the mercury in its composition, but because of its unsightly appearance and demoralizing effects upon the dental profession. The manner in which it was introduced into the country called forth the censure of all having a regard for professional etiquette: "Two adventurers, without skill or any claim to the title of dentist, suddenly appeared in New York and began dental practice amid such a shower of advertisements, a profusion of display, and a metaphorical flourish of trumpets, as caused our staid and dignified dental ancestry to bound with surprise and indignation." *

From that time onward the use of amalgam has increased, until now tons are consumed yearly in filling teeth. Dr. Harris, in his opening address to the first class of the Baltimore College of Dental Surgery, in 1840, says: "It is one of the most objectionable articles for filling teeth that can be employed, and yet from the wonderful virtues ascribed to this pernicious compound by those who used it, thousands were induced to try its efficacy."

At the meetings of the dental societies this subject was spiritedly discussed with strong arguments against its use. The first official act in the matter was the appointment in 1841 of a committee by the American Society of Dental Surgeons to report on the use of lithodeon—mineral paste, and all other substances of which mercury is an ingredient, for stopping teeth. They reported in substance that the use of all such articles was hurtful to the teeth and every part of the mouth, and that there was no tooth in which caries in it could be arrested and the organ rendered serviceable by being filled, in which gold could not be employed. This report was unanimously adopted.†

At a meeting of the same society July 20, 1843, the use of amalgams was declared to be malpractice, and a committee appointed to further investigate the subject. They referred the matter to the Medical Society of the county of Onondaga, New

*History of American Dentistry.

†American Journal of Dental Science.

York. The report of the medical committee was to the effect that no care in the combination or use of the paste will prevent its occasional bad effects.

In 1845, the Mississippi Valley Association of Dental Surgeons resolved that the use of Amalgam fillings was unprofessional and injurious, and would not be countenanced by its members. The actions of the various societies had very little effect; amalgam forced its way into the offices of the majority of dentists in the country. Many excellent practitioners were expelled, and others resigned from the societies to which they belonged.

In 1850, a resolution was passed unanimously by the American Society of Dental Surgeons to rescind the pledge made by the same society previously. Thus ended the so-called amalgam war. It will be observed that no scientific researches were made to ascertain whether deleterious effects were produced by mercury; the chief object of the disturbance was, apparently, to rid the profession of charlatans and their obnoxious materials. These discussions, which have caused so much bitterness and enmity among the members of societies, have latterly aroused a feeling of enquiry into the scientific analysis of this filling for teeth, resulting in the discovery of a quality in its composition capable of producing salivation, and all other symptoms of poisoning. Many able practitioners of dentistry have experimented with all the different acids with no satisfactory results. When we consider that nitric acid dissolves mercury at 60° F.; concentrated sulphuric acid dissolves mercury only when heated; hydro-chloric acid does not affect it at all—how can we expect the weaker acids of the mouth, diluted by saliva, to cause a chemical change?

If past experiments have proved unsatisfactory, it does not discourage me in the attempt to discover, if possible, by experiment and by the careful study of the subject of mercury in its every particular, some clue to this perplexing question. Having satisfied myself that the poisonous effects are not produced by the chemical changes in the mouth, I have entirely ignored this theory, and have looked about for a more simple and direct cause. In commenting upon mercurial poisoning, the idea has been advanced that the vaporization of mercury takes place only during the hardening process, and, that being consummated so quickly, no deleterious effects can occur.

In the construction of an amalgam two changes take place, the first being the mechanical, or mixing together of the ingredients, the second the chemical, or hardening of the composition. My first experiment was to place metallic mercury in a four ounce glass-stoppered bottle, and submit it to the gold test, by suspending a piece of gold foil in the centre of the bottle, taking care that it did not come in contact with the sides, and cementing the stopper. I placed it under different temperatures, of from 20 to 130° F. In about thirty-six hours the surface of the gold became coated with mercury, giving it a gray color. This proved the evaporation of the metal. I then mixed a quantity of the Chicago Refining Co.'s amalgam, according to their formula, three parts of mercury to eight parts of filings, and subjected it to the same test. The reagent was not sufficiently delicate to produce any perceptible change. Wishing to bring the highest chemical skill to bear upon the experiments, I consulted Prof. Haines, of Rush Medical College, who kindly assisted me. At his suggestion, I procured two delicate reagents, the ammonio-nitrate of silver, and the chloride of platinum. In preparing the ammonio-nitrate of silver, I allowed thirty grains of nitrate of silver to the ounce of water, and put a small quantity of the solution in the test tube. This was heated, and aqua ammonia added until a precipitate formed. Increasing the aqua ammonia until the precipitate cleared up, I took a quill and, with this liquid, wrote upon white paper. After putting the substance to be tested in the bottle, the strip of paper was placed across the mouth of the bottle, and the stopper cemented. Should a vapor arise, the liquid would become black. Leaving the bottle for ten minutes, I examined it again, and found the writing in plain black coloring. The chloride of platinum produced the same results, but required more time to accomplish it. The rapidity with which the evaporation of mercury takes place depends upon the amount of heat and the surface exposed, and not upon the quantity of mercury contained in the fillings. Thus a jar containing one quart of water would evaporate the same quantity as a jar of like surface containing a gallon, the latter taking four times longer to empty.

In the following experiments, I attached a thermometer to a water bath, and heated to the temperature of the body, 98° to 100° F., to maintain an even temperature. I conducted these experiments in the dark, as the rays of light decompose the

ammonio-nitrate of silver. The strips of paper containing the reagent were placed in the mouths of all the bottles, including an empty bottle, which was used in each experiment, to prove there was no mistake.

Experiment No. 2—Three bottles were prepared. In the first was placed an amalgam filling made from Chicago Refining Company's amalgam, according to their formula. In the second was placed an amalgam filling of like size, containing five grains more of mercury. In the third bottle there was nothing. After a lapse of ten minutes I examined the bottles and found the writing on the paper across the mouth of bottles Nos. 1 and 2 was black, while there was no discoloration of paper in the third bottle.

Experiment No. 3—A repetition of No. 2, with the exception of the reagent chloride of platinum being substituted for the ammonio-nitrate of silver. The results were the same in both. The time required for the latter being ten hours, while but ten minutes were required for the ammonio-nitrate of silver. In conducting the remainder of the experiments the ammonio-nitrate of silver was employed, it being the more delicate reagent, consequently producing a more marked impression, and also consuming less time than chloride of platinum.

Experiment No. 4—Two bottles were prepared. In the first bottle were placed scraps of amalgam six months old. In the second there was nothing. In ten minutes the writing on the paper was black in the first bottle, and uncolored in the second.

Experiment No. 5—Bottle No. 1 contained amalgam fillings which had remained in the teeth from two to ten years. Bottle No. 2 was empty. The results in both being the same as in experiment No. 4.

Experiment No. 6—In bottle No. 1 I put an amalgam filling which had been in the mouth sixteen years. In bottle No. 2 there was nothing. At the end of twenty-four hours I found the paper discolored in the first, and not in the second.

Experiment No. 7—To demonstrate that nothing in the composition of the fresh filings could cause the discoloration I allowed some filings to remain sealed in the bottle for twenty-four hours. At the end of that time discovered no signs of color on the paper.

Experiment No. 8—I procured four preparations of mercurious vivus.

No. 1 contained $\frac{1}{10}$ gr. mercury to 1 gr. of sugar of milk.
No. 2 " $\frac{1}{100}$ " " " "
No. 3 " $\frac{1}{1000}$ " " " "
No. 6 " $\frac{1}{1000000}$ " " " "

A small quantity of each of these preparations was placed in bottles marked 1, 2, 3, 4. In No. 5 there was nothing save the reagent. The effect was alike in each of the four bottles containing the mixture. Those having the greatest quantity of mercury caused the deepest color to the paper and required less time. As before, No. 5 was unaffected.

In order to determine the difference, if any, in weight after evaporation, I obtained strong glass tubes one-half inch in length, and one-fourth inch in diameter, and packed them carefully with amalgam fillings. Allowing twenty-four hours for hardening, I weighed them, and at the end of three months I again weighed them, finding in some no change at all, and in others an increase of weight. This is accounted for by the fact that oxydation and accumulation of moisture on the amalgam equaled in some and exceeded in others the loss of weight by evaporation. I am in possession of numberless cases of poisoning from mercury in amalgam fillings. I will mention but one, and report one case from my practice.

The Dental Register, January, 1872, has the following case of poisoning from mercury in a tooth filling: "John T. Smith died from salivation, caused from having a tooth filled with amalgam. Dr. Sprague attended the case, and afterwards called Drs. Davis and Buffin, all of whom agreed that he was suffering from the effects of mercury present in the amalgam used in filling one of his teeth. The filling had salivated the unfortunate man, and, as the inside of his mouth, throat and windpipe swelled, respiration was hindered, and finally ceased altogether. Dr. Davis made the post-mortem examination in the presence of the coroner and jury of inquest, opening the chest, taking out the lungs, and extracting the filled tooth. No signs of any other diseases were found, except that caused by the mercury, and it was made clear to the jury by the Doctor that this caused his death. The jury returned a verdict that the deceased came to his death by suffocation, caused by inflammation of the glands and infiltration of the tissues of the neck, producing closing of the trachea by pressure

thereon; 'and we further believe that the above causes were brought about by the action of mercury, used in filling the second molar tooth of the right side of the lower jaw, by Dr. E. D. Keef, Marysville, Kansas.'"

A case in practice: A lady from one of the towns in Illinois came to Chicago for treatment, having been troubled with dyspepsia and nervous debility for two years. While under the physician's care she complained constantly of a peculiar feeling and taste in her mouth. The doctor suspected the trouble might arise from a rubber plate which she had worn for four years, and advised her to consult me. Upon examination, I found a full upper plate, composed of rubber, and on the lower jaw the molars were gone, except the second and third upon the left side. In the crown of the wisdom tooth was a large amalgam filling, and also one in the crown and posterior approximal surface extending to the free margin of the gum in the second molar. These had been inserted about two years previous. I noticed that the gums and the mucous lining of the mouth and salivary glands were quite tender. There was a strong metallic taste in the mouth, and a metallic odor to the breath. She had a peculiar paralyzed sensation in the left side of the tongue, which she had experienced for two years. She also informed me that the saliva flowed so freely that at night her clothing and pillow were saturated, and estimated the loss of saliva each night to equal one pint. I suggested the removal of the amalgam fillings and rubber plate, and substitution of gold. She assented to the proposition, and as early as possible I undertook the operations. Upon removing the amalgam fillings and applying the rubber dam, the saliva flowed in streams, completely saturating several towels. After refilling the teeth, and inserting a gold plate, the unpleasant sensation in the tongue and metallic taste disappeared. At the end of two weeks the glands were greatly improved, and the soreness under the tongue (of which she had complained at her first visit) was healed.

It is the accepted opinion of physicians generally, that mercury uncombined has no constitutional effect. Dr. Atkinson said before the meeting of the American Dental Association in Boston, August, 1880: "You must combine the molecules of mercury with some other agent before they can have any affinity for the body at all. One who is familiar with the old method of making

looking-glasses, with tin foil and mercury, knows that the workman would be literally saturated with it, so that he could not be capable of handling a gold or silver watch without its becoming amalgamated, and all this, too, without his health being compromised by the mercury so long as it remains in a metallic state."

The correctness of this theory may be questioned, as it has been proven that these workmen have been affected by the vapor of mercury, when not protected by a veil over the mouth and nose.

Dr. Barthølow, in his work on Therapeutics, p. 177, says: "As used in the mechanical arts, by gilders and others, the fumes of mercury cause wasting, ptyalism, necrosis of bones, trembling, impaired intellect, and, in women, abortion." "Walter Pope mentions a workman who for six months had not handled mercury; yet he rendered a piece of copper as white as silver by rubbing it between his fingers." Parish says that long trituration of calomel increases its power to salivate. This is also applicable to all preparations of mercury used with an excipient, medicinally. The homeopaths divide and subdivide particles, according to the required preparations, some of the radical members of the school claiming best results from the highest potencies, while the more conservative practitioners prefer a middle ground. They rub up pure mercury with sugar of milk into six different grades, the first containing one-tenth gr. of mercury to one gr. sugar of milk; the second, one one-hundredth gr. mercury to one gr. sugar of milk, etc., as before mentioned in this paper. These are the finest forms in which mercury is prescribed, and yet the severest cases of salivation and constitutional symptoms have been produced by these agents, on account of their being so readily taken up by the blood. Is it not a reasonable supposition that, if poisonous symptoms are produced in proportion with the subdivision of the particles of mercury, that the system will be more severely affected by the vapor of mercury, which is finer than any mechanical subdivision can be? Dr. Somers recalls an instance of a lady patient becoming completely salivated, the gums and mucous lining of the mouth inflamed and teeth loosened, by taking a second bath, in which forty grains of the black oxide of mercury were used. He thinks she could not have absorbed one-twentieth of the amount in the form of vapor.

As a forcible illustration, I quote the experience of the sailors

on board the man-of-war "Triumph," which, in April, 1810, took from the wreck of a Spanish ship thirty tons of quicksilver, contained in bags of fifty pounds each.

In the course of a fortnight some of the bags decayed and burst, the quick-silver mixing with the bilge water, the emanations from which coated all the metal about the ship. Nearly all the crew were salivated.

In order to ascertain the effect of the vapor of mercury, I have employed it in a series of experiments upon plants and animals.

Experiment No. 1—While conducting my experiments in the laboratory I was frequently visited by a family of roaches, who appeared to take an interest in my operations. Suddenly they all disappeared, and it immediately suggested itself to my mind that their sudden departure argued favorably in the question of utilizing them in my experiments. I took four two-ounce bottles and put in No. 1 pure mercury; No. 2, amalgam scraps six months old; No. 3, fillings from two to ten years old; No. 4, fillings sixteen years old. After placing a roach in each bottle, I tied a piece of cloth over the mouth in order that the air might circulate. Evidently the bugs were not fond of mercury, for they clung to the tops of the bottles as long as life lasted. Roach in No. 1, containing pure mercury, died in three days; roach in No. 2 was next to follow; roach in No. 3 lived a few days longer; and in No. 4 outlived them all by several days.

Experiment No. 2—I prepared three bottles. The No. 1 contained ten grains of pure mercury; No. 2 contained an amalgam filling three months old; No. 3 was an empty bottle. In each of the bottles I put two roaches. In two days one in the bottle containing pure mercury died; the remaining one in the same bottle lived nine days from the time it was put in. In the bottle containing the amalgam filling one roach died in four days, while the other one died in eleven days; while those in the empty bottle lived fifteen and sixteen days.

Experiment No. 3—On February 9th I placed an amalgam filling at the base of a sensitive plant. On examination, about the fourth day, I discovered that the extremities of the leaves had changed color and were dry and brittle, like the leaves in early Autumn; gradually the whole leaf was affected, and at the end

of ten days the plant was dead, notwithstanding the care and nourishment it received.

Experiment No. 4—In a four-quart glass jar I put about four ounces of mercury, and made a platform of wire gauze, fastening it two inches from the bottom of the jar. I placed a Guinea pig in the jar, and covered the top with gauze. Twice each day I removed him for exercise and nourishment. He thrived well for ten days, but at the end of that time he commenced to droop, and refused food and water. He became emaciated and trembling; the body and limbs were cold. He lingered along for two weeks and died.

Experiment No. 5—I administered six grains of mercurius vivus, first trituration, to a dog with his supper, and repeated the dose next morning with his breakfast. The blood and liver were examined under the microscope in the evening and found to contain globules of mercury.

It is the opinion of many eminent scientists that mercury inhaled into the lungs produces a greater effect than when taken into the stomach. Among this number Prof. Stillé in his Therapeutics, Vol. 2, page 789, says: "Of the several modes by which mercury is made to enter the body, inhalation most speedily produces the specific influence of the medicine." Claude Bernard, late Professor in "Le College de France," makes the same statement in one of his lectures. This is readily understood when we consider that the drug taken into the lungs in the form of vapor is distributed over a large surface and brought in direct contact with oxygenated blood, and thus carried directly to all parts of the body.

Mercury taken into the system in small quantities, long continued, manifests itself in a variety of ways. One of the first symptoms noticeable is an increased flow of the secretions of the body—salivation being the most striking—the glands becoming inflamed and the mucous membrane tender. The gums tumefy and change in color to a dark rose tint; the tongue is swollen; the patient not only experiences an unpleasant metallic taste, but the breath becomes impregnated also. Sometimes extensive ulcers attack the throat, gums and cheeks; œdema of the glottis, with difficulty in breathing and swallowing. The digestive apparatus is involved, with loss of appetite, nausea and vomiting,

and frequently pain and tenderness of the stomach; the bowels loose, and often bloody stools. The fatty constituents are removed, and the patient becomes emaciated; no part of the body is more affected by mercury than the nervous system; the body trembles; sometimes one limb, and again both limbs contract. A sense of coldness and occasional chills are experienced; often neuralgic pains are felt, particularly around the motor nerves; mental debility and loss of memory. These are some of the many symptoms caused by the inhalation of the vapor of mercury.

RESUME.

There are in the market many varieties of amalgams. Evaporation does not depend upon quality or age, but all amalgams will send off the vapor of mercury. This has been proved conclusively by its destruction of animal and vegetable life, and by chemical tests. Evaporation is facilitated by an increase of surface, consequently a greater amount of vapor would arise from several small fillings than from one large filling. The facility with which mercury is taken into the lungs by continued inhalations and the rapidity with which it enters the blood, requires less mercury to produce systemic effects than when taken into the stomach. In order to produce systemic effects from metallic mercury, it must be rubbed up with an excipient, to reduce the particles to a size capable of entering the capillary system, or it must be taken into the lungs in the form of vapor.

DISCUSSION.

DR. SPALDING said that the results of the experiments described in the paper were in accordance with the homeopathic theory that infinitesimal quantities, if in extreme subdivision and continuously administered, are capable of producing marked constitutional effects; and he proceeded to explain the scheme of homeopathic dilutions, by the American or decimal, and the European or centesimal, scales.

DR. BLACK asked Dr. Talbot if he had repeated the experiments with the same portions of mercurial preparations that had been once used.

DR. TALBOT: I have not, since the amount of mercury contained in the preparations appeared to make little or no difference

in the results. I went home from the meeting of the society last year dissatisfied with what our friends from St. Louis had said on the amalgam question and determined to find out, if possible, what are the facts in the case. I have spent much time, and taken great care, in making these experiments, and the results have been quite different from what I expected they would be when I began to make them.

DR. TEMPLETON: I have supposed that the coating of sulphide of silver, or of oxides, upon the surface of amalgam plugs, would be impervious to the vapor of mercury, and prevent its evaporation from a plug.

DR. CUSHING: We should bear in mind that these experiments out of the mouth are not conclusive proof of what takes place in the mouth. The condition of the oral cavity may greatly modify chemical action, and conclusions based solely upon experiments made out of the mouth may prove misleading.

DR. BLACK: Dr. Talbot has proven that vapor of mercury is given off from amalgam plugs, but the most important fact set forth in the paper is the effect produced upon the cockroaches. It appears from the experiments upon them that the vapor of mercury is injurious to animal life. It remains to continue the experiments, for the purpose of ascertaining what effect it has upon higher forms of animal life. There are thousands of people going about with amalgam plugs in their teeth, who seem not to suffer from it, and there are many, also, who, on careful examination, *do* appear to suffer from some cause. It is important to ascertain, if possible, just what effects the mercury in amalgam plugs is capable of producing.

DR. SPALDING: I am glad that these experiments have been made. They teach an important lesson in therapeutics. The evaporation from amalgam plugs in the mouth is continuous, since a uniform temperature is constantly maintained, or nearly so. The vapor of mercury will pass readily through water, or any of the metallic oxides. Many people can take continuously such very small quantities of mercury without injury, while others are susceptible to harm from the continued exhibition of these minute quantities. I think the experiments are as conclusive as any can be that have covered no wider field, and I hope they will be continued and extended.

DR. HARLAN: Will mercury be absorbed through the hand by mixing amalgam in it?

DR. SPALDING: Probably not, the subdivision of the particles of mercury not being minute enough.

DR. TEMPLETON: Will a gold plate worn in the mouth of a person saturated with mercury, absorb enough of it to interfere with soldering, if it should need mending?

DR. SPALDING: Yes, I have had a gold plate presented for repair that was whitened with mercury, and the man who wore it was so saturated with it that particles of mercury could be pressed out of the mucous membrane of the mouth, and gathered together in advance of a spatula passed over the surface, so that the globules could be seen.

DR. TALBOT: That mercury can be absorbed through the hand is probable, since some diseases are treated by rubbing mercury under the arms, etc., for the purpose of having it absorbed into the system. Stillé mentions a young lady who was so saturated with mercury that it came out through the skin with the perspiration, and could be gathered in globules upon the surface of the skin.

DR. BROPHY: This is the first time, to my knowledge, that the amalgam question has been properly presented, and these experiments furnish the first explanation that has been given as to how the mercury from amalgam plugs can get into the system. They show that mercury may evaporate from plugs and be inhaled into the lungs or absorbed through the tissues of the mouth, so as to produce injurious effects in some cases. We believe the mercury is oxidized and goes into the system as an oxide, though some suppose that it goes through the system as pure mercury, acting by its presence. I can confirm all that Dr. Talbot said about the case in his practice, having consulted with him in regard to it.

DR. DORN: Has any one seen gold fillings that were affected by the vapor of mercury from amalgam fillings in the same mouth?

DR. TAFT: I am gratified with the course that this discussion has taken. I have never yet made an amalgam filling. The old discussion of this question thirty years ago made such

an impression upon me that I have never used amalgam. These experiments and the conclusions derived from them have been put forth here as being entirely new, but Dr. Watt and myself conducted a series of experiments twenty-five years ago, which were sufficient to show that there is evaporation of mercury from amalgam plugs, and that the vapor of mercury is very subtle and penetrating. Some persons will tolerate it with entire impunity; others suffer somewhat from the effects of it, and a few suffer seriously. It is insidious, and in many cases the cause of the trouble is never discovered.

There are many hidden affections and obscure diseases that physicians cannot understand, and which baffle their skill. In some instances amalgam fillings play an important part in the production of such affections. It would seem that in the vapor, the particles of mercury are divisible almost to the atomic condition, and are consequently in the condition to be absorbed and diffused with the greatest possible readiness, and to produce the greatest effect with the smallest quantity.

Mercury will evaporate at ordinary temperature anywhere unless sealed up in an iron vessel. The evaporation being faster, of course, the higher the temperature. Many have supposed that the evaporation from plugs will cease after a time, but the experiments given here show that it does not. It oxidizes readily in the air, and if taken into the body in vapor it is very strange if it is not oxidized; but how could Dr. Spalding press it out of the gums in metallic globules, if it did not remain metallic?

I have seen gold fillings and gold plates whitened in mouths containing amalgam plugs. This would not be likely to be caused by medicines containing mercury in combination. The effect upon the system will be exceedingly various in different cases.

Many seem to suffer no inconvenience, and yet who can say that any who have it are wholly free from its injurious impression? Many suffer from it in a more or less marked degree without being aware of the cause. Others suffer much when the cause is easily traceable to amalgam fillings. To the close and intelligent observer such cases will frequently appear. The behavior of amalgams is very different in different mouths, and in the same mouth at different times. Subtle influences affect amalgams oftentimes in a mysterious way. This, with a number of other objectionable features, has prevented me from using it.

DR. SPALDING: It has been recently observed, after the administration of the salts of mercury in large doses, that the mercury could be recovered from the blood in metallic form. This fact raises the question whether the therapeutic effects of mercury are not always due to its action as a metal, and whether its use in the form of salts is not mainly advantageous by reason of the state of division in which the mercury is found after decomposition of the salts. The particles of the metal seen in the blood are of course microscopic, and are, indeed, very minute, requiring a high magnifying power for their discovery.

WHAT MUST BE THE PREPARATION FOR THE SUCCESSFUL PRACTICE OF DENTISTRY IN THE FUTURE?

BY DR. C. A. KITCHEN, OF ROCKFORD.

THE title suggests several questions. 1st. What is success in the practice of dentistry? 2d. What may we expect the future of dentistry to be? And 3d. What preparation will be needed to enable one to achieve success?

That my object may not be misunderstood in the selection of this title, I will confess to you in the beginning that I shall not be able to advance any new ideas about success. I am not a prophet to foretell what the future will develop, nor can I give directions by which a competence may be secured or a prominent position reached; I only hope by offering a few thoughts to induce discussion that will draw forth the opinions of those present whose views are well worthy our consideration.

There is not an occupation which does not offer opportunities for success. Almost *every* man hopes and expects to succeed, but there are many diverging ranks which seem to approach it, and there is a vast difference between temporary and *permanent*, apparent and *real* success, which very many fail to *fully* comprehend.

Men are often disappointed and unhappy because they cannot reach by easy and direct paths the same results others have achieved only after years of *patient toil*. All around us may be

seen those who have underestimated *true* success, and who have disregarded the fixed laws and fundamental principles which underlie it.

Men who engage in the struggle for wealth without capital or business capacity, in opposition to those who have both combined, are placed at great disadvantage. In the learned professions knowledge and skill *represent* capital, and he who does not possess them will meet with discouragement and disaster in the strife with cultured and skillful competitors.

If we scrutinize closely—get at inside *facts*—we will find in the history of successes and failures that "There *is* no easy path to fortune;" "Nor is there a royal road to learning."

Success in our calling does not materially differ from that in other professions, or in other pursuits. Here, as elsewhere, men mistake the *apparent* for the *real*; yet the rule holds good with us that "there is no excellence without *great labor*." There *is* a class who avoid the labor of preparation, yet *seem* to be prosperous. They try in every way to create such an impression, for *effect*. They hope, by advertisements, offers of cheap rates, newspaper puffs, and other means well known and practiced by them, to convince the public that they are doing a large business, and are therefore worthy of confidence and patronage. These men care nothing for the advancement of the profession—they realize that it has already advanced beyond *their* reach. They take no interest in convention work, but use considerable energy in devising plans to thwart the efforts put forth by others to elevate the standard.

Observe this class closely; mark their influence upon young men; examine the work of their hands—and you will have to pronounce them *miserable failures*.

There is another class whose motives are very different. They take a lively *interest* in progress; they love to convene, to interchange views and examine each other's methods; they desire to encourage and assist worthy younger men; they honor and emulate our leaders; they strive constantly to render honorable, intelligent and skillful services to their patrons.

If I have interpreted correctly the *meaning* of true success, we must conclude the *latter* are the *successful* men of to-day.

What of the future? We know what has caused progress in the past; we know that these same agencies exist, with even

greater power, now. *These*, with certain *other* unmistakable signs, point to still greater developments in the future.

There never was a time when the necessity for thorough education was so generally recognized as at the present. Prominent educators and thoughtful writers see the errors in our common school system, and are urging radical changes and reforms. Polytechnic, industrial, and other schools for special training are springing into existence; leading medical men are striving to elevate their standard of learning. The same subject has elicited earnest attention and warm discussion in our dental associations. Everywhere this desire for advancement is manifested. As a result, plans will be evolved by which both general and special education will be more thorough and effective.

Our profession must not lag behind in this movement all *along the line*. With increased opportunities there will be greater possibilities and responsibilities which the dentist of the future will be required to meet.

The tendency in all progressive scientific pursuits is toward a division of labor, a centralization of thought and effort upon a particular part or branch. Dentistry is no exception to this. In the larger cities it has been practically separated into departments already. It is not improbable that another division will be made in time.

Many of our ambitious and aspiring men are seeking more light continually. Through their investigations we shall all come to know more about the *causes* of decay in teeth, and more about the indirect as well as the direct effects of diseased teeth upon the system. With this added knowledge there will arise the desire to treat diseases that are not now considered within our realm.

The competent dentist may with propriety correctly diagnose and intelligently treat patients for many of the nervous derangements which are so alarmingly prevalent in this country. He may also be called upon to perform all surgical operations about the mouth. Physicians generally will gladly direct this class of patients to dentists, if assured that they are prepared to render the services needed.

Dr. George M. Beard, the eminent writer and lecturer on nervous diseases, pays this compliment to American dentists:

"That premature decay of the teeth is a result of civilization is an undeniable fact, and in those whose constitutions are

depleted of force, the teeth are rarely good. They are only kept in fair working order by the great skill of modern dentistry. *Dentists are the barometers* of civilization. Their rise and prosperity is one of the most instructive facts in modern sociology. American dentists are the best in the world, because American teeth are the poorest in the world."

There is no immediate prospect that the general health or the condition of the teeth will greatly improve; therefore, more knowledge and greater skill will be required to do the important work awaiting those who prepare themselves to do it *well*.

Much difference of opinion exists in regard to the amount and kind of preparation needed. We often hear this question propounded: What is the use of a college or medical education for one who simply performs mechanical operations? While *others* say, and truly too, if we hope to take a place and be recognized among the professions we must enjoin upon our students the *full course*, including complete *medical* education.

There may be some good reasons for the views entertained by both, but regardless of all views or theories, the *fact* is evident that dentistry is no longer looked upon as *simply* a *mechanical* art, but is known to occupy a conspicuous position among scientific callings, and is now recognized as an important department of medical science. Students who fully realize *this* will naturally desire to possess *thorough* medical education, because it is the basis and ground-work of every specialty.

Many dentists have already taken the degrees in medicine, and are warmly welcomed and most courteously treated by members of the older profession. These are as *links* binding more securely the two branches of the great art of healing, whose interests are, even at the present time, closely interwoven.

None can doubt, I think, that the *best* preparation for the young men *now* entering our ranks would be, first, a complete common school and academic education; afterwards, a thorough knowledge of medicine, ending with the dental course of instruction. Diplomas should be issued by the colleges only to those who merit them.

Men holding certificates of graduation from reputable dental and medical colleges, who have no greater *attainments* than others who hold none, or even those who have bought *bogus* diplomas, cast reproach upon the institutions that have too kindly

favored them. The objection may be urged that too much time will be needed to complete so full a course. I will answer this by pointing to the hundreds of poorly prepared men who *wait hopelessly*, year after year, for success which never comes, and ask you to compare these with that other type of men who have the most nearly *met* all of these requirements.

The *fact* is patent to all that one class are *forced* to resort to every subterfuge, to even reduce their prices to a level with those of the common day laborer in order to obtain business, while educated, competent dentists, *as a rule*, pursue a dignified, professional course. Their services are usually appreciated and well remunerated.

After a careful survey of these and numerous other significant facts, are we not forced to the conclusion that in order to be *truly* successful, to fully meet the constantly increasing demand, to reach the *highest* achievements in the future, we must, as members and students in an advancing profession, educate our minds as well as our hands, to perform intelligent as well as skillful labor, for the time is surely approaching when only learned men can hope to reach real and permanent success in the learned professions.

DISCUSSION.

DR. SPALDING: When a man has a *mission* to which he habitually devotes whatever time and thought he can spare from the regular routine of professional labor, he is apt to feel very much interested, and to be ready with something to say, whenever the subject in which he is so specially interested is up for discussion. It has been, for many years, a principal object of my life to promote the preparation of young men for successful practice.

The successful practitioner of dentistry requires a wider range of qualifications than is needful for almost any other calling. He must have the natural ability to become a skillful physician, and must possess fine mechanical ability. He must have uprightness and integrity of character, and be a polished gentleman. Every profession takes rank according to the character and qualifications of its practitioners. A thorough, scientific preparation is the very ground-work of a successful education.

As a rule, the colleges have put men through a course occupying a certain length of time, and have then graduated them,

though in very many cases but poorly prepared for practice. There has been much ground for complaint in this respect.

We are now trying to insist upon a proper preliminary education. The college with which I am connected has been obliged to refuse several applicants, advising them that they were not fitted to profit by a course of dental lectures. It is difficult to enforce these necessary rules; many colleges are so poor that the temptation is great to receive ignorant pupils, rather than lose the fees that they would pay. The University of Michigan has established an excellent standard of preliminary education. That institution is supported by the State, and therefore not subjected to pecuniary difficulties as many of the other Dental Colleges are.

The colleges are doing the best they can, and the teachers in them are doing a vast amount of poorly paid, self-denying work for very little thanks except from some of those they have taught.

I believe the standard has been kept up by the colleges rather higher, and advanced rather faster, than the masses of the profession will sustain them in. It is the duty of every practitioner to hold up the hands of those who are engaged in this labor of love—for such it truly is, and any who may engage in teaching from more sordid motives are likely very soon to tire of it. The men who are doing this work are doing it out of love for their calling, and in hope to advance the status of the profession. What shall dental education be in the future? In the power of skillful manipulation, the American dentists are in advance of the rest of the world, and we have many ingenious men who are bringing out every sort of appliance to assist and promote the mechanical perfection of our operations; but we are behind the nations of the Old World in scientific education.

Just such institutions as this society are doing a great work for practitioners.

The literature of the profession is the next valuable means of improvement, and the most important of all are the dental schools.

The great need of the profession now is that by rule no man shall be called a dentist who does not hold a degree. I believe that every man's title is a property in which he ought to be protected by law, so that no man should be allowed to call himself by a title unless he has earned it by proper preparation, and this

view should be urged as one of the reasons for the passage of suitable dental laws.

What proportion of dental graduates succeed? Many of them go off into other pursuits, because they were so imperfectly prepared for practice. This can be avoided, but only by the united action of all the members of the profession. As for myself, my life is devoted to this work, and there are many others who feel as I do. These are the ones who will carry the burden of toil and care, in carrying into effect whatever changes or improvements the future may bring forth in the methods or standards of professional education.

DR. BLACK: Our profession is passing through a peculiar phase of its life. It is not the same, and the requirements of students are not the same that they were ten years ago. There has been an advance. The profession is almost divided as to this advance. The difference of feeling and habit is very different with different members of the profession. On this account a change is necessary in the dental schools. It is not so very long since it used to be said that "good *apprentices* make good citizens;" but apprenticeship has passed away, on account of changes in the phases of our civilization. A change like this is going on in the dental profession. What portion of the best dentists are now taking students? I think very few. They find it difficult or impracticable to instruct them in the office. The students are therefore compelled to go directly to the colleges, or to go into offices that they would not prefer.

This being the case, much more is required of the colleges than mere theoretical teaching. As our fingers require to be peculiarly educated, it is important that there should be excellent opportunity for thorough training in manipulation, and I think it will be required that the *professors* shall give their time to demonstrations instead of leaving all the manipulative training of students to the care of comparatively inexperienced demonstrators. It is impossible, also, that they should give the *best* manipulative training by taking the students occasionally to their offices, but the professors should go regularly to the infirmary.

A student should at least have learned how to study, before he goes to a dental college. The power of mental application and consecutive thought, and such a range of information and

knowledge of language as will enable him to understand the subjects that will be presented to him, is the very least preliminary education that should ever be admissible.

Is dentistry a specialty of medicine? If it is not, pray what is it? If it *is*, it should be on a par with other specialties in medicine. I do not mean that we should spend our time demanding *recognition* from the medical profession. We shall get it soon enough, but if we want it we must make the requisite preparation. The specialist in medicine the world over has a greater work of preparation than the general practitioner. He must understand general medicine as well as the general practitioner, and thoroughly understand his specialty in addition. That is to say, the specialist must be the superior man, and it will be required of dentistry to take that position. The demand is forcing itself upon us, and the schools must meet that issue.

DR. BROPHY: I heartily agree with the paper and with what Dr. Black has just said. It is impossible with poor material to get excellent results. If the colleges do not have good men for students they cannot turn out graduates who will make first-class practitioners. The question has been much discussed whether dentistry is a specialty of medicine. If it is so, it is not a profession by itself. The American Dental Association has resolved that "Dental surgery is a specialty in medical science." I regret to say, however, that this distinguished body does not demand that their students shall receive a full medical education, an attainment absolutely essential before they can justly enter upon the practice of medicine or any of its specialties.

What is medicine and what is dentistry? Medicine relates to all diseases, and the means of relieving them; dentistry relates to diseases of the mouth and jaws, and especially the teeth, and the means for relieving them. I think it is impossible to go away from this meeting without seeing and realizing that we are dealing with medical subjects. Dentistry is a specialty of medicine. It is only within the last century that surgery was incorporated as a part of medical practice. It is not very long since eye and ear treatment was in the hands of quacks, and the same is true of gynecology. Do any of these have separate schools?

Dentistry is the most important of the medical specialties, because almost every person, at some time or other, needs our

services; because of the range and the importance of the subjects included in it, and the necessity and urgency of the demand for the services we are able to render.

Why should we seek to maintain an independent profession, when our natural, appropriate and most useful place is in association with the medical profession? If it is asked, What should the mechanical dentist do? I answer, He should take all the lectures of the dental school, the same as any other dentist, but in clinical training he should spend his time chiefly upon the special work that he intends to do.

There is no trouble about recognition, but there is one certain door by which the medical profession must be entered. He who attends the lectures and obtains the diploma of a medical college will be recognized as a medical man.

As to preliminary education, I believe that any one who has pluck, a good common school education, and some knowledge of Latin, will be able to enter a dental or medical school, and give a good account of himself. No man when he graduates from a medical college ought to regard his professional education as completed. On the contrary, we ought all of us to be students as long as we live.

I do not agree exactly with Dr. Black in regard to dispensing altogether with an office pupilage. I think that is very desirable. There are many things that bear an important relation to success beside strictly professional training, and these can be far better learned in an office than in college or infirmary.

There are many who have become eminent medical men in dentistry by their own efforts, without the help of the medical schools. All honor to such!

It is not alone the dentists who are to be benefitted by teaching dentistry in the medical schools as a specialty of medicine. The medical men, who see more patients than we can, and see them oftener, will be enabled to do much more than they now do to secure the perfection and preservation of the teeth.

DR. TAFT: The remarks that have been made look toward the future. One way to estimate the future is by the current of present events. Another method by which to judge of the future of the profession is by the demands made upon it by the public. Are we able to meet these demands? Are any of us ready to meet all emergencies, or able in all cases to perform the services

that our patients desire of us? I apprehend that none will make that claim. Shall we endeavor to meet the demand?

The public understands better than formerly what the profession is able to do. A great many people in every community know that much can be done for the preservation of the teeth, and so they are disposed to ask us to do still more. That people thus understand and urge us forward is a good indication, and the profession will endeavor to make the attainments necessary to meet this demand.

The scope of the training demanded of the student is continually enlarging. The same is true of the range of subjects considered in our societies. We discuss general hygiene for the sake of the teeth; and so, with medicinal agents; dentists are searching everywhere for suitable remedies.

I must take exception to the statement, quoted in the paper, that American teeth are the worst in the world, and worse now than formerly. I do not believe it. The average longevity is increasing; from having formerly been estimated at thirty years, it is now approaching forty.

This is due greatly to better medical treatment, to better food, clothing, and hygienic conditions; and partly to better dentists. Disease producing agents are better understood and avoided.

I believe that teeth improve, that longevity increases, and that there is an upward tendency, and growth and progress, and this should stimulate us to greater efforts for the advancement of our own profession.

DR. SPALDING: The position was taken by Dr. Black that dentists are divided in opinion as to the position which the dental profession ought to take, and the methods by which dental education should be conducted in the future. I do not think the division is so serious, or the difference of opinion between the two parties so great, as might be inferred from his remarks.

I believe the difference is mostly one of policy and method as to what *can* be done, and the best way to undertake it. There is no one who would not say that there should be a previous medical education *if it can be done*. The question is, whether we shall go on in the course which experience has found to be so useful, or try a radically different plan. I believe that we should

maintain the dental schools as they are, adding more and more medical instruction till they include a full medical education in their curriculum.

The field of medicine is very wide. It is not possible for any one to go over the entire field with the thoroughness with which the specialist studies his own department. The general practitioner must learn well the things he must use in every day practice. The specialist should obtain the general knowledge that will help his specialty, and give most of his time to a thorough mastery of every detail of his own specialty. I believe that the dental schools are better fitted to take up and carry on this work than are the medical schools. The teachers in them know what is wanted, and will use all the support that you give them to promote the desired end.

OPERATIVE DENTISTRY.

BY DR. GEO. S. MILES, OF JERSEYVILLE.

In responding to the request of the Executive Committee, I do not expect to say anything that will be new to the members of this Society.

I presume the committee felt that this branch of the profession was of such importance that some space in the programme should be allotted to it, if but to open the discussion, which may be so profitably continued by the members here present.

Nearly all the different pursuits in life, trades and professions, are divided into sections or branches in such a manner that a person following one or two will achieve greater perfection and influence than if he endeavored to attend to all the different branches of the trade or profession with which he is connected.

In the manufacture of the watch; an article so indispensable to every gentleman; instead of the manufacture of all its many parts being confided to one individual, the mechanism of it is divided into many sections, and one person gives his or her attention to one particular part, another to another, and so on until the beautiful chronometer is produced, each part fitting

with exact nicety, and keeping time to the delight and admiration of the most critical.

The steam engine, printing press, electric, telegraphic machine, and many other important and wonderful inventions that are interwoven with the welfare and business existence of the race, could never have been produced and made to perform the duties required of them with that exact nicety and satisfaction but for the fact that their several parts were allotted each to skilled workmen of tried capacity.

The same principle applies to the several professions that does to mechanical arts. The practitioner at law could not have attained the high position that many of the profession in this country now occupy, had they undertaken to counsel and advise within the whole range of jurisprudence, for it is patent to all that the most eminent practitioners, those who have accomplished the most for their clients, as well as themselves, are those who have confined themselves to a limited range of practice.

The same principle applies to the practice of medicine, and especially is such the case if dentistry is a specialty in medicine. Not many years ago it was not unusual for a person to combine the practice of dentistry with some other calling or profession. It seemed to be quite popular for clergymen to divide their clerical labor with dental practice; I suppose, with the idea that while ministering to their spiritual needs they could also attend to their physical requirements, and at the same time replenish their exchequer. So far as my knowledge extends, these gentlemen have been about equally successful as preachers and dentists, and as the standard of dentistry has advanced, they have found there was enough range in their profession to engage one person's attention, and they have withdrawn, and many are now in the insurance business, for which I presume they are better adapted. All agree at this day that there is enough in the practice of dentistry to demand a person's whole attention. How best to acquire the proper information and practical experience to fit a person for the work, is the conundrum. A thorough knowledge of medicine is no disadvantage to the dentist, but it is certainly an accomplishment. The same may be said of law and theology.

It is not deemed important that a practitioner at law should understand theology, or that the teacher of theology should be profound in the mysteries of law; and while dentistry may be

considered to be more intimately connected with medicine than the other professions are with each other, the graduate of medicine is very poorly fitted to practice dentistry; and yet he should be, and is, I doubt not, prepared to practice surgery, treat diseases of the eye and ear, and many other diseases of the system which are recognized as specialties in medicine when practiced as such. Wherever dentistry is introduced in a medical school an additional corps of teachers is required, and at the present day, as they exist, I have no doubt the graduate of medicine obtains information that he would not receive but for this fact. At the same time the dental student is benefited from what instruction he may receive in medicine. But as no one person can know everything, it does not seem important that a dental student should be required to pursue and understand all of those branches of medicine and the nature and treatment of all the diseases of the human system, when he never expects to make any use of the instruction thus obtained; but thorough instruction in all those branches of dental science and art, the pathology of the dental organs, and the treatment of those diseases in any way connected with the oral cavity, or appertaining to the duties of the dental practitioner, would prepare the student better for the work selected. The mind of the dental student should not be diverted from his subject, but his whole attention given to the central aim of his life.

The subject of operative dentistry presents a wide field for scientific investigation and artistic study. From infancy to old age the operator is called upon to diagnose the many troubles of the oral cavity, and exercise what knowledge and skill he possesses in ministering to the needs of those thus afflicted. Very few people in this era are exempt from the necessity for the services of a dentist; hence, it is very important that thorough investigation be made of each case that presents itself, so that correct conclusions may be drawn, and a proper course of treatment decided upon.

In examining the teeth, a delicate instrument is needed to inspect carefully each tooth, the interstices in the grinding surfaces, between the teeth, around the necks of the teeth, and often under the gums. In many cases this can only be done satisfactorily by the use of floss silk, drawn between the teeth, and by wedging the teeth apart.

Before commencing to fill teeth that are decayed, it is often best to remove every particle of tartar that may be attached to them. In some cases it is imperative. No one should allow a patient to go from his office understanding her work is completed, who desires her teeth put in proper condition, without seeing they are perfectly free from tartar, and the patient instructed how to keep them free from the accumulation.

Upon examination of a case we find quite a number of teeth decayed in different parts of the mouth. In filling teeth that are decayed upon the proximal surfaces of the incisors sufficient space should be made to prepare the cavity, insert the filling, condense and finish the same in a proper manner. How best to obtain this space so that the filling may be firmly condensed around the margins, and after completion the tooth present the proper shape for durability and general appearance, is the question.

Judgment must be used as the case presents itself, depending upon the quality, shape and position of the teeth and the extent of the decay. Where the incisors are considerably wider at and near the cutting edge, the proximal surfaces touching each other, with decay near the neck of the tooth, reaching near the point of contact, I think the space should be obtained by wedging. This may be accomplished with cotton or orange wood, as you prefer. Very little if any filing should be done, from the fact that very soon after the operation is completed, the teeth will come in contact again, and the surfaces filed would be broader, and without the rounded contour which was natural to them. Substances would collect between them, and decay would be more liable to supervene. Where the decay is near the cutting edge, in proximal cavities, and the position of the teeth to each other such that they would impinge upon each other even after considerable tooth structure was removed, I would prefer not to injure the shape of the tooth by removing much of the tooth substance, but obtain space by wedging and by taking away only the slender edge of the walls, or portion of the walls, and retain the proper shape of the teeth—the contour of the filling depending upon the extent of the decay, but so shaped that as small a portion as possible would press upon the adjacent tooth. A flat surface should be avoided in proximal fillings, and care should be taken that the other extreme be not reached, and a too prominent contour given to the filling for permanency.

If practicable, the teeth should be left, after the fillings are completed, with a narrow space between them, in order that they may be the more easily kept clean. The molars and bicuspids not being so exposed to view, while it is desirable to retain a proper shape, I do not deem it as important to retain so closely the shape of the tooth as in the incisors, but such separations should be made and frail walls cut away as will enable the operator to insert a filling for the longest period.

Much has been said and written during the past few years in regard to materials for filling teeth—considerable that is quite valuable: not a little that I believe had better not have been written, if indeed it has not been pernicious in its influence upon others who may have inclined to a system or adopted suggestions without sufficient investigation.

There has been a tendency to run to extremes in the use of materials and appliances in our profession, and also an inclination to follow in grooves or the tracks of others, rather than to exercise one's own judgment of what is best for each individual case.

Of the materials for filling teeth, gold should stand *first* as the *jewel* to take the place of lost tooth structure. By far the larger proportion of teeth may be filled with gold in some of its forms of preparation, in a more durable manner, and present a more beautiful and cleanly appearance, than other now discovered preparations; especially is gold preferable for the incisors and cuspids. There are many large cavities of decay in the molars and bicuspids, where the walls are frail, in which an amalgam preparation may be used, and preserve the teeth for a longer period than if the cavities were filled with gold. Indeed, teeth may be filled with this material the walls of which are so frail that it would be nearly if not quite impossible to fill with gold. Again, the expense of inserting these large gold fillings is such as to debar many from having their teeth attended to, unless some cheaper material can be used. They cannot afford to pay the price for these large gold fillings that would be equitable — at least they think they can not, and they will not — and the question hinges right here: Shall these teeth be allowed to continue in their onward career to destruction, and ultimately be shelled from the mouth as you would shell peas from the pod, by the artificial tooth *fiend*, or shall we arrest the decay and fill these teeth with amalgam or tin, as the case may be? I believe in sav-

ing the teeth. One reason for the dislike of amalgam has been, I think, the quality of the preparation, and the neglect in the preparation of the cavity of decay, and the proper introduction and finishing of the filling. Quite as much care should be exercised in filling with amalgam as with gold.

It is equally important to use the rubber dam, for it is very essential to keep all moisture from the filling, while it is being inserted and for a half hour or more after. By this means you are able to finish the filling in a more perfect manner, giving it a finer and more complete finish after the material has hardened considerably, which is a great desideratum.

Attention should be paid to the saving of children's teeth, so that they may be used for mastication, until the natural period for their removal, for the permanent set. Tin foil and gutta-percha are very good materials to use in these teeth, and will generally fulfill the requirements demanded of them.

Many operators have a preference in the amalgams now manufactured. Others seem to act upon the theory that they are all of about the same class, and use the cheapest. Each manufacturer claims his to be equal if not superior to others. The opinions of those qualified to judge, who are not interested in the sale of the article, I think would be preferable. But I think what would be still better would be the appointment of a competent committee, by this society, or by the "American Dental Association," to investigate and experiment in regard to the proper ingredients, and the relative proportions of each, until (if possible) they can report a formula of a preparation that will not shrink from the walls, and that is not injurious to tooth structure if proper care is taken in introducing the filling.

The operative dentist is often called upon to perform operations in the oral cavity, other than filling teeth. His ingenuity and skill are not infrequently brought into use in correcting irregularities of teeth. Children's teeth, in consequence of the neglect of parents, or imperfect development of the maxilla, are very often crowded from that symmetrical position designed by nature, and present a very forbidding appearance. In youth this condition of affairs may be changed. The crowded condition being removed, not only is their liability to decay greatly lessened, but a wonderful change wrought in the whole facial expression of the patient. At times this would require the removal of a bicus-

pid or molar, to make room, but very seldom, if ever, the extraction of any tooth anterior to these; for it is very important that the incisors and cuspids should be saved for general appearance. Various, and in some cases quite ingenious, appliances are constructed for changing the position of the teeth, requiring considerable time in accomplishing the purpose; but often this can be effected very easily by the use of silk ligatures attached to the teeth, connected with rubber rings. Frequently we see an incisor that has been allowed to strike behind the lower teeth. This position may be very readily changed by adjusting a plate over several of the lower teeth, so arranged that the incisor desired to be moved will strike upon an inclined plane in closing the mouth. We see teeth almost every day with exposed pulps. It is highly important to preserve this vital principle of the tooth, if possible. This can be done if there is no inflammation, or chronic disease, in or about the organ, by covering the nerve with Fletcher's or Weston's preparation. The antiseptic pulp dressing of Dr. Spalding I believe is a very good article for this purpose; covering it with oxychloride and, after the zinc filling is hard, fill the tooth as usual. If the pulp is in an inflamed condition, or dead, it should be removed to the apex of the root, the nerve cavity purified, and the canals filled, care being taken to hermetically seal the nerve cavity at the apex, that no moisture may permeate the filling.

Many teeth are neglected until the crowns are broken off, or nearly so. In many of these cases, if the root is strong, I think it better to attach an artificial crown than to remove the root and subject the patient to the necessity of wearing a plate. While it is possible and practicable to save the root of a tooth, it should be allowed to remain, and perform the function for which it was designed. The pathological condition of the teeth and oral cavity generally should receive careful attention at the hands of the dentist. From childhood to old age there are many diseases of the teeth, gums and alveoli that require attentive care, or serious results are sure to supervene. But it is impossible, nor is it necessary, to allude to them at this time, as they will be treated, or have been, in papers devoted to those special points.

Each year is developing some new thought, new method, new material. May it be ours to discriminate in their application, and act intelligently to elevate the standard and advance the interests of our profession.

FILLINGS.

BY DR. J. M. HURTT, OF PEORIA.

Much has been said well and done well in operative dentistry, resulting in many permanent operations. The man who has the ability to follow Doctor Arthur by using that nicety of discrimination in the teeth to be operated on, and then patiently executing the skillfully and delicately polished surfaces required by his theory, demonstrates courage and indomitable energy.

Those operators who are constantly beveling teeth for self-cleansing surfaces, necessarily avoid contour operations. Young operators who produce frequent contour fillings must occasionally fail; and if they do not protect cusps of pulpless teeth, some must be lost. And need we be surprised that from these the "new departure" receives new allies?

Young graduates sometimes risk their reputation on amalgam, and afterwards wish they hadn't. An old practitioner may use cement and gutta-percha with a hope of saving his aching back and enervated nervous system, while theoretically he expects as good fillings as before; but, alas, proves the theory a practical untruth! Therefore, let us cull the principles which, when carried out, result in durable operations, remembering as well that we must, necessarily, occasionally fail.

When gold, amalgam, tin or cement remain in teeth only a few weeks, the retaining grooves are usually at fault. When they remain a year or more, we must look further for the true cause of failure. As we depend largely on the pits, grooves and general anchorages to retain our finished fillings, let us look at their preparation a few minutes. The rubber dam should be applied, when practicable, before commencing to excavate, for there are few cavities which can be prepared properly without its previous careful adjustment. Grooves near the grinding surfaces of a tooth should be strong, and made in a direction to accommodate that finish of the filling which will so antagonize occluding teeth that the force in masticating will be concentrated toward the center of the organ, rather than distributed to the periphery. Also, suppose it requires two hundred grindings of the teeth at each meal to prepare food for insalivation; at this

rate over two hundred thousand occlusions will be required each year, which suggests the strength requisite in the grooves to resist this force.

Pits or grooves in large cavities in proximal surfaces of incisors and cuspids, if made wholly in the dentine, commencing near the cutting edge, and proceeding toward the pulp, being careful not to approach too near that organ, will retain a filling better, and be more easily filled, than when made in the opposite direction. In this way the point of the tooth is not weakened, and the cutting force of the lower teeth will not be so apt to dislodge the filling, if these retainers are well filled. This pit or groove should not be filled with soft foil, but cohesive—a very narrow, short strip of, say No. 20, or No. 30 is best, filling very carefully, and overlapping the edges, in order to weld the gold in the retainer, by bands, to the body of the filling. A small gold screw, if driven into the dentine at this point, is still better, allowing the screw to cut its own thread. This is a difficult operation, for, if the sides of the screw touch the enamel plates, they will be checked, and, after filling, either discoloration or decay ensue. In large cavities in bicuspids and molars, the retainers should be made in the dentine, if possible, using the enamel to assist in retaining the filling when it is very resistant, and only then to assist in forming a general dovetail. There are few exceptions to this rule. When making general anchorages in grinding surfaces, remember that all cusps in pulpless teeth are to be protected from being split off. Retaining pits in the cervical portion of a cavity should be wholly in the dentine.

Fillings are lost from cavities prepared by good operators, for man in his entirety is imperfect, and his labor, partaking of this bias, must bear the imprint. Also the best patrons do not carry out strictly our simplest instructions for the preservation of their teeth. With this in mind, we may examine the reasons for fillings being lost.

Tin fillings gradually wear away except on unused surfaces, and usually leave the walls uninjured, if the cavities are properly prepared and carefully filled. Gutta-percha is worn away much as tin, but it does not preserve the walls as well, for sometimes we see extensive decay at the cervical margins of these fillings. Similar decay occurs around cement fillings, when we have been careful to avoid it, and even in those teeth that are said to indi-

cate its use, chalky and pulpless ones. These cavities are due either to minute air vesicles at the margins, improperly mixing, improper proportions, slowness in inserting the filling, or not keeping the filling dry long enough. In cavities of chalky teeth, in surfaces cleansed in masticating, and in proximal where they do not extend to the gingival border, cement is the best filling until a change of the tooth structure takes place. In healthy mouths where nothing is eaten between meals, we may succeed with cement in cavities extending under the gum. Decay may occur anywhere around an amalgam filling, or the amalgam may disappoint by preserving the tooth. In my observations these are rules and not exceptions. A good cement wears away less rapidly than tin, and often leaves the walls in good condition, while amalgam does not wear away except at the margins. Cement is easy of insertion, and disappoints by cavities forming under the gum, nearly exposing the pulp, while the surface seen looks well. Amalgam may have decaying dentine under its entire surface, and the pulp slowly perishing, while its external surface looks bright, and nothing but a mere line of demarkation appear as a sign of this destruction below.

These defects are rarely noticeable in gold fillings, bearing in mind painstaking, patiently-executed operations. Gutta-percha in all its forms, when used as a filling, is but a temporary stopping in my hands.

Amalgam fillings fail from expansion, contraction, improper insertion, improper finish and oxidation; and no matter how carefully instructed, or diligent to learn the principles governing these, the operator is just as liable to failure where he needs the effect of this training as he is to have a better filling where he is indifferent as to the result; and the novice is at still greater disadvantage.

Gold fillings fail from improper preparation of the cavities, want of adaptation to the walls, marring the margins in consolidation, roughening the edges and surface of the tooth around the filling when finishing, with a failure to properly polish this surface, especially at the cervix; allowing softened portions of enamel to remain because difficult of access and sensitive to the excavator, risking a failure rather than a temporarily disagreeable impression; an improper finish of the occluding surface; the insertion of a gold filling where it is contra-indicated; too severe

malleting; wedging a piece of annealed gold between a wall and the main body of filling, to repair a defect after the gold is consolidated, causing undue pressure.

All the causes herein enumerated may be modified and frequently avoided by careful manipulation and studious attention to details. I am aware, however, that there are many operators whose conceit and inaptitude in manipulative ability preclude the possibility of success in the finer operations of operative dentistry; or, perhaps, better say the converse of diligence prevents success.

I am aware, too, that there are many sensitive natures who have the keenness of foresight, pliability for adaptation, latent skill and tact, sense of honor and ambition, to bless us by their advice and society, but who are too modest to attempt any public display for fear of criticism, and cannot openly canvass the operations, essays and conduct of those who care less for such judgment. We should encourage these by the hand of fellowship, enabling them to stem the tide and make an effort, despite forebodings and much perspiring. But beside all this, we owe it to our society and fellow-men beyond this narrower circle, to give whatever data we think we have, though humbly, in broken sentences, and sometimes in imperfect clinics.

I have at times found men who expressed in the finest dicta, the principles of practical operations, almost totally incompetent to carry them out. On the contrary, I have found men who would tremble and alternately perspire and chill while in their seats, at the thought of attempting to speak in open society, and who, when they did speak, uttered broken sentences, saying almost totally the opposite of what they intended, becoming disgusted with themselves for making the attempt at all, not only capable of carrying out the principles enunciated by others, but were themselves astonished to find that they were really good operators. Some of the best fillings I have seen, and these of gold, were from the hands of men who had passed through the trying ordeal of learning to talk in open society. Every member should be encouraged to emulate those who *have* learned to speak well in public.

As gold has been attacked many times during the past few years, and the cheaper fillings bolstered by many a pen, let us see if there are not some redeeming features about practical reasons for our failures with gold. Some of these have been urged upon

your attention and been disregarded. One of these is the improper preparation of the cavity. The literature of this society is replete with information on this subject; yet I wish to again say a few words here. I repeat, it seems to me impossible to properly prepare a cavity without first adjusting the rubber dam. Excavating is less painful after the cavity is dry, the walls and recesses are more readily disclosed, and in many cases the supposition of a pulp exposure is dispelled. I am satisfied that the truth has not been sufficiently impressed on our minds that the cervix should be excavated until the margin is smooth, solid, and free from a prominent ridge. There are softened lines of enamel near the cervix, which extend laterally from cavities in proximal surfaces, which demand removal for success. Opportunities for seeing operations at the hands of another should not be lost if we would have points of inestimable value discover themselves to us. In the clinics, follow the operator from beginning to end, and thus prove a patient student. In very large cavities, fill the main portion with cement, and while pliable, make, with a blunt excavator or old plugger, the size you wish, retaining pits in the cement, and after hardening remove any protruding surplus obstructing the view, and partially depend on these to anchor the filling. In many cases these retainers will be sufficient.

Many dentists commence filling by introducing pieces of gold too large for perfect adaptation to the walls. The edges should be true and smooth, but if a larger pellet is placed against the wall than can be made solid, an attempt will be made to condense it by undue pressure towards the face of the tooth, and thus crush the margin, inviting certain decay; or, if the gold is not condensed against the floor or wall, a defect will remain after finishing, that will cause future trouble. It frequently happens that a larger piece of gold than is suitable is forced into a groove or pit, and the wall fractured or broken, and the tooth afterwards decays at that point. Another, and one of the most prolific causes of failure of gold fillings is the finishing or want of true finish to the fillings and the enamel surface. In filing, great care should be taken not to mar the tooth, and to avoid a possible roughening of enamel about the filling.

A thorough polish is of great benefit; one minute is not enough—five, ten, twenty, an hour—according to circumstances. You will become weary, and *then* your patient sometimes com-

plains; be faithful and honest, and if you have been kind he will come to you again with cheer. I believe there is more in the preservative effect in those fillings which are water-tight, from leaving the enamel surface untouched, than from all the chemical and electro-chemical theories heard of. That the margins of the tooth around gold fillings in proximal cavities can be finished without marring the polished enamel, I know. But no careless, impatient dentist, who cares for the gain only, is capable of learning how it is done. Gold is the best material yet found for the *great majority* of cases, and no other filling material now known will save them equally well. As the expert must learn how to finish a filling of gold, so the bungler must rise to an immensely higher plane to be able to properly fill a cavity with gold.

Fillings that are too full and approach too near the pulp, will, in the close approximation to that organ, by continued strokes, eventually cause inflammation, and a deposit of "calcific granules" in its substance, and, assisted by thermal changes, result in its devitalization.

When the filling is too full at the grinding surface we have the condition of an undue closure against it, and, unless the unfilled organ occluding the one filled, is worn away twice the amount of those without fillings, it will act as a constant source of neuralgia, and a continual reminder of the one-fourth million necessitous occlusions to keep up a year's mortal existence. The effect of the general wearing away of the teeth is not a release of the pressure on fillings, because metals, such as gold and amalgam, are hardened on their hammered surfaces, and the oftener they are occluded the harder the surfaces become, until in the case of malleable amalgam and gold, the filling must break asunder, the walls of the tooth yield, or the tooth take on inflammation. Therefore, gold and amalgam fillings should be dressed off when they occlude an antagonist, at least once a year. Under this constant physico-dental malleting the gold expands laterally, and sometimes causes pressure, resulting in dentine or enamel disintegration. If this pressure is not removed so that the teeth will close evenly, the pericemental membrane will become thickened, and in the case of a tooth with a live pulp, produce a "calcific deposit" in that organ or upon the root, or in the case of a pulpless tooth, take on inflammation, which, becoming chronic, will result in a fistula, with constant flow of pus.

DISCUSSION.

DR. TOWNSEND: There are two points in Dr. Hurtt's essay to which I desire to call attention. One is the chalky enamel, which is often left next the lateral walls of proximal cavities in molars and bicuspids. I have no doubt that many failures are caused in that way. In most cases there is a softened condition of the enamel extending laterally on each side of these cavities; the surface is smooth, and the exploring instrument passes over it so smoothly that the operator is often deceived. The color, which is lighter and more opaque than sound enamel, will alone enable us to distinguish it. After the surface is penetrated it is found more or less softened.

Where I cut through from the grinding surface I cut away the lateral walls sufficiently to include this softened portion. The advantages of this method are many. The unsound enamel is all removed. The gold in the adjacent teeth comes in contact, and not the enamel. Any food allowed to remain between the teeth lodges against the filling instead of the enamel. The lateral margins of the cavity are in plain sight, and easily examined; and last, but by no means least, the lateral margins of the filling are easily cleaned with the brush.

The other point I wish to speak of is retaining points near the cutting edge in proximal cavities in incisors. The best means I have ever found for retaining fillings in these cases, where the corner is weak or gone entirely, is a retaining screw, inserted diagonally, starting in as near the cutting edge as possible without touching the plates of enamel, and drilling in a direction from the point of the tooth somewhat toward the gum on the opposite side instead of at a right angle, care being taken not to encroach upon the pulp. In thick teeth with small pulps this is easily accomplished; but in thin teeth with large pulps it is extremely difficult to insert a retaining screw successfully. If it touches either plate of enamel it will fracture it, and to start sufficiently high up to avoid the enamel endangers the pulp; but the advantages to be gained in the increased strength afforded to a filling of this kind by a well inserted retaining screw are such that I feel justified in running some risks to secure this end.

DR. TALBOT: Do you always cut through from the grinding surface in molars and bicuspids?

DR. TOWNSEND: I do in the majority of cases, but not in all.

DR. NOYES: The arch of enamel (and dentine) at the proximal corner of a bicuspid is its principal strength to prevent the splitting of the tooth or the breaking off of one of the cusps under the force of mastication, and I do not think it justifiable to spoil that arch by cutting from the crown merely for the sake of an opportunity to work. I would spend a week in wedging such teeth apart sooner than notch the grinding surface unnecessarily. If the cavities are so large that the overhang is composed wholly of enamel, of course it had best be cut away.

DR. TAYLOR: One's practice is modified by his surroundings. Dr. Townsend and myself often have patients from the country who may not be able to come again for a month or two, and we cannot have the four days or a week in which to wedge the teeth apart, but must do the best we can. Dr. Miles' paper referred to the time when it was common for a dentist to have several other callings. That day is not quite yet gone by. There is a dentist in the town where I live who is also a music teacher, a photographer, a healer of piles, etc., etc.

DR. TOWNSEND: I never cut through from the grinding surface merely to gain room for operating, but because I believe that I can better preserve the teeth in a majority of cases in that way. I wedge apart until sufficient space is gained to finish the filling after the contour is fully restored, and often instruct country patients to wedge the teeth themselves before coming. In soft teeth, with a tendency to proximal decay, and especially in young persons, I almost invariably cut through, but in hard, dense teeth of older people it is often not so necessary.

DR. K. B. DAVIS: There is not much difficulty in making good operations in grinding surface cavities, but proximal cavities in bicuspids and molars are the difficult cases. A very prominent error is often seen in the way such fillings are finished. In natural jaws of the best models we see but one point of the proximal surface of a tooth in contact with its fellow. Suppose there are cavities in both teeth extending to the gum, they are often filled and finished so that they touch from crown to cervix, having far larger surfaces in contact than before. If we study nature's models we shall restore the original shape, when they

will be safer than at first, because the most exposed points are now gold. They should be finished, if possible, so that two convex surfaces of gold will touch.

DR. HANAFORD: Do you bevel the lateral margins of such cavities?

DR. DAVIS: A very little, not enough to make an attenuated edge of gold.

DR. HARLAN: I think the way to properly finish such fillings is to use the thinnest separating files to separate the fillings, and finish at the neck with strips of emery paper, making the teeth smaller at the necks, so that the natural shape is retained, and they are easily cleaned at the margin of the gum.

DR. TALBOT: In a crowded arch we sometimes see a first molar much decayed, and the convexity of the adjoining bicuspid crowded into the cavity. In such cases I would separate well for several days, and would cut away the inner corner of the molar quite freely, partly because the small amount of enamel at the neck of a molar is liable to chip off if not removed, but chiefly to increase the space between the teeth at their necks on the lingual side, and leave a space and surfaces easily cleaned.

DR. TAYLOR: I have found the ribbon saws superior to the separating files for cutting through narrow spaces, because they cut only at the edge, and are flexible.

DR. BLACK: (Showed a carrier which he had made for thin files.) It is strong enough to hold them rigidly, so that a thin file may be used with some force in the same way as a heavier one, without breaking. This is important in the finishing of approximal cavities when it is desirable that the teeth be not separated by wedging or otherwise.

In excavating approximal cavities it is very important that a square shoulder be obtained at the cervical margin. In these decays the cavity just within the enamel often extends below the outer margin, leaving some enamel which appears sound; the gum is much in the way if this be cut away so as to make this portion of the cavity square; but if it be not cut away it is very likely to break in packing the gold, and being so much hidden, may escape notice and work the ruin of the filling. Pits for anchorage are best, placed at the outer and inner angles, so that

the cervical wall be not weakened. The gold should not, as a rule, be laid out over the cervical wall at once, but it should be approached from the deeper part of the cavity and gradually built out over the margin, otherwise it is likely to spring off from the margin, causing a leak. To prevent this, we build up to the margin, keeping the condensed gold as thick as the case will allow, and give us a certainty of getting at the margin perfectly. We ought also to condense the cervical portion of the filling, if possible, after the gold is all in. I have here a set of double curved instruments for that purpose, with which I can condense the cervical portion of any filling. Those for the distal cavities have the mallet end curved in a half circle, so that it may be struck in a direction away from the patient. The instrument is twelve inches long.

DR. TEMPLETON: What do you think of using tin at the cervical margin for the sake of its therapeutic effect upon the wall of the cavity?

DR. BLACK: I do not think anything of it. If fearful of injuring the margin of the cavity I would use ammoniated foil, which is as soft as any tin. The extra cohesive foil (which condition implies the greatest softness, purity and cleanness) will become perfectly non-cohesive by a few minutes' exposure to ammonia, without in the least impairing its softness. It may easily be ammoniated by placing in a box or drawer together with a bit of spunk or cotton damped with spirits of ammonia and closed for a short time. It may be kept thus in a special box for use. It will become perfectly non-cohesive, so that it will not weld any more than tissue paper will weld, and makes the best cushion for margins that I have yet tried. I place such thickness as I may desire on my margin and then secure it by placing cohesive gold over it exactly as is done in covering the margins with *tin*. Whenever we have foil that is not cohesive after annealing, it is because there is something on its surface that heat will not drive off. Phosphorus and sulphur, and perhaps many other things, will accomplish that. Ammoniated foil is easily reannealed, and then welds perfectly. Many of the things that are liable to make foil permanently non-cohesive are of an acid nature and the foil is protected from them by ammonia. All the metals are welding metals if clean. Gold

does not attract oxygen to its surface and so is easily welded cold. Platina does attract oxygen and cannot be welded cold, but by covering platina with gold we can get the welding property of the gold and also of the platina beneath it, and they will become a coherent mass under the plugger. Some persons spoil their gold by annealing in a lamp after touching the wick with the phosphorus or sulphur of a match.

DR. BROPHY asked if the saw-frame shown by Dr. Black is manufactured by any one for sale.

DR. BLACK: It is not. I have urged several dealers in dental goods to make them, but have finally had to make one myself for my own use.

DR. TEMPLETON, of Pittsburg: I have seen many failures of approximal fillings because not well condensed on the side of the cavity next to the operator. It is often impossible to get the point of a mallet plugger into the bottom of the undercuts in such places so as to be effective, and I am convinced that the best course to pursue is to use soft foil and hand pressure in such places. One thing about this meeting has pleased me very much. I have not once heard the phrase "electro-magnetic mallet." I have become very much disgusted with the enthusiastic devotion of many who use that instrument, who talk of little else than electric mallet, and talk of that about all the time. I was one year on the executive committee of the Pennsylvania State Society, and tried very hard to make a programme without it, but met with only partial success. My objection to the electro-magnetic mallet is this: We all know that a tooth will move a little in its socket under a blow, and rebound or recover its former position after a slight pressure or stroke, and it will endure it and not get sore if the blows do not come so fast as to prevent its return to its natural position in the interval between them; but if the blows are repeated too frequently, the tooth is kept vibrating, and I do not believe that gold can be welded on a vibrating surface. There are other objections, in the irregularity and uncertainty of batteries, the difficulty and inconvenience of managing them, and the complicated mechanism of the mallet, the frequent cutting away of much sound tooth structure for the sake of getting the force in a direct line, the cutting or grinding up of the walls of the cavity, rendering it impossible to make a

moisture-tight joint, etc. I believe that the best results are obtained by a combination of hand and mallet force.

Dr. French, of Pittsburg: I am sorry that my friend, Dr. Templeton, should have brought up the subject of the electro-magnetic mallet here, where nothing would have been heard about it but for him. I am afraid that opposition to it is as much of a hobby with him as the defence of it is with some others of our Pennsylvania dentists. The paper said that the rubber dam should be applied for excavating. I believe the dam should be on before any work is done. I have taken pleasure in carefully and thoroughly trying both ways and noticing the different conditions and results, and there is no room to question the very great advantages of having the work dry from the first. Teeth are far less sensitive when dry.

Dr. Morrison: The more simple the instruments we use the better, if they are adapted to the work to be done. If we go on twenty-five years as we have in the past, no office will be large enough to hold all the appliances and machinery of a complete outfit.

Dr. Brophy illustrated on the blackboard some instruments made by Dr. Talbot for shaping the cervical margins and side walls of cavities, and also illustrated a bicuspid having a hollow proximal face at the neck on which a file will either leave some over-lapping gold or else shoulder the neck of the tooth. Fillings in such teeth must be trimmed at the cervical margin with cutting instruments.

SUGGESTIONS RELATIVE TO THE CAUSE OF RAPID DENTAL DECAY.

BY DR. C. W. SPALDING, OF ST. LOUIS.

During the last year I have given considerable attention to the examination of the mixed fluid of the mouth which is commonly denominated saliva. This examination has been devoted chiefly to the chemical properties of this fluid, with a view of determining how far this property of saliva is responsible for

that rapid decay of the teeth which practitioners of dentistry so often encounter.

In common, I believe, with many other practitioners, I have supposed that an acid condition of saliva prevails, or at least may usually be looked for in most cases of rapid decay of the teeth. Under this impression I entered upon a series of chemical tests with a view of endeavoring to discover the cause of this assumed chemical condition of saliva.

My observations have resulted in the formation of an opinion amounting almost to conviction, that the agency heretofore ascribed to the chemical condition of saliva in promoting decay of the teeth in healthy persons, has been largely over-estimated, if it has not been altogether erroneous.

My first experiments were made upon the saliva of a young girl (aged 12), whose teeth were decaying rapidly, so much so that fillings previously inserted, that is, before the case came into my hands, whether of gold or of other materials, had lasted but a short time, and in whose teeth new cavities were constantly forming, and this at so rapid a rate that cavities of considerable size would form in the space of a few months, notwithstanding pretty thorough cleanliness and good general care. I looked to find an acid reaction of the saliva in this case, and had been reflecting on a course of medical treatment, having in view the correction of this supposed condition of the saliva. What, then, was my surprise, on finding after repeated tests, that the saliva of this young person exhibited in every test either a neutral or a slightly alkaline chemical reaction! In no one of a large number of tests was there any, even the smallest acid reaction shown. I immediately sought other cases where a similar destructive process was going on, but the result in each was precisely the same as in the case just narrated. Indeed, in none was an acid condition present where the subject was in passably good health.

A professional friend also made similar tests in some very marked cases of rapid decay with the same results—no acid condition of saliva revealed.

I do not wish to be misunderstood. I am not combatting the idea that an acid condition of the saliva would promote decay of the teeth. I have no doubt it would do so, but I am endeavoring to show this condition of the saliva is not usual in states of ordinarily good health while the teeth do often rapidly

decay, although the general health is not perceptibly, or at least not seriously, disturbed. The view I now present is, if the general health is good or fair, and the saliva normal, or nearly so, any rapid decay of the teeth must be attributed to some other cause than acid saliva. In certain localities favoring the lodgment and retention of food, decomposition of food substances probably takes place accompanied perhaps by the generation of acid. But many of the cavities of the class now under consideration, are located at points very unfavorable to retention, and it would not be fair to assume that decay occurring at these points was occasioned by products resulting from either the partial digestion, the oxidation, or any other change in food substances.

Are there any other known methods by which acids may be generated, to whose action this rapid decay of the teeth may be fairly attributed? Let the chemists answer. If yes, the methods should be sought out and explained that the chemical theory, as it relates to this class of cases, may be fairly presented. If, however, the chemical theory is found, on thorough investigation, to be inadequate to the production of this class of cavities, or of any cavities under the conditions I have presented, some other cause must be invoked. Are these undetermined causes external or internal to the teeth, or both internal and external? Under the suggestion that internal forces may become important predisposing causes to decay of the teeth, our thoughts turn at once to faulty development, and to the period when calcification of the teeth is going on. The calcification of the deciduous teeth commences about the fourth or fifth month of fetal life, and that of the permanent teeth during the ninth month of fetal life, or the first month after birth. It will therefore be seen that if medicinal treatment is to be attempted, it should be commenced at an early period of fetal growth. The calcific process continues uninterruptedly until the completion of the third molars, which it is probably safe to say does not take place earlier than the fifteenth year. Yet I think we may with fairness conclude that if the deciduous teeth are perfectly developed, no medication will be required to insure a similar condition of the permanent set.

If defective development is to be regarded as a primary predisposing cause of the early and speedy decay of the teeth, our attention should, first of all, be directed to the most effective means of correcting this evil. Evidently there is but one mode

by which preventive or corrective methods can be made effectual previous to birth. It is only through the blood of the mother that ante-natal treatment can be successfully applied. But whether defective development is due to a scanty supply of nutrient material, or to a lack of assimilative or developmental force in the individual, is first to be considered, that treatment may conform to diagnosis. If to insufficient supply, would not the defect be manifest in the general osseous system? The amount of mineral salts requisite for the calcification of the teeth,—or I might limit the comparison to the enamel of the teeth,—is small, compared with that which is necessary to construct the entire skeleton. I may here notice the fact that bone and dentine are but imperfectly calcified at birth, and that deposition of lime salts goes on at a rather rapid rate for a considerable time after birth; and it should also be noted that the post-partum deposition of lime salts is probably slower and more difficult in enamel than it is in either bone or dentine. This latter implies the greater need for ante-natal methods of insuring the perfect formation of enamel. But to return. The relatively small amount of lime salts composing the hard elements of an entire denture would scarcely be missed if the deficiency was equally distributed over the whole osseous system. If defective enamel is owing to an insufficiency of supply, would not the defect be general and show itself elsewhere as well as in the enamel of the teeth? I am aware that the tardy closure of the fontanelles, and the late hardening of the bones of the infant, are indications of a lack of ossific material; but these cases are exceptional, and include but a small proportion of those in which rapid decay of the teeth is a marked and prominent symptom. If this condition does not proceed from a deficiency of nutritive material, it must necessarily arise from a want of assimilative force. I am inclined to accept the latter hypothesis, and to attribute the faulty formation to what I may call defective lime function, rather than to a lack of the substance itself. If this view is correct, we are at once brought into the field of preventive medicine, a field that has been but imperfectly tilled, especially that branch which relates to medical treatment of the unborn child.

Probably Jenner was the first to bring into notice an useful example of preventive medicine when he announced the discovery

that cow-pox inoculation was a preventive of small-pox. This was also one of the first revelations of the prophylactic utility of the law of similars. Grawvogl has more recently applied this law to the correction of hereditary ante-natal deformities, by the use of prophylactics administered to the mother. He reports a case of what may be called hereditary *hydrocephalus acutus*, although neither of the parents exhibited any tendency towards this disease. Two children had been born in this family and both had been attacked in early life, both cases terminating fatally. The parents are described as being healthy, both having blonde hair, thin skin and blue eyes, one being spare and the other of full habit. The disease began to be developed in both children coincidently with the eruption of the lower incisor teeth.

Osseous nutrition is always deficient in *hydrocephalus*, resulting probably from defective assimilation. This imperfection would probably manifest itself in the formation of the teeth as well as in the cranial bones, and, if so, the cause must have been in operation previous to their eruption. This latter event is usually accompanied by considerable disturbance of the nutritive processes, and this disturbance may well be supposed to occasion manifestation of any predisposing causes of disease that had heretofore lain dormant. Hence, the concurrence of *hydrocephalus* and dentition.

In the treatment of the above named case sulphur and calcarea phos. were given, one dose of either on alternate days to the mother, commencing at the beginning of gestation and continuing to the birth of the child. Two additional children have been born of the same parents, both under this treatment of the mother, and both now respectively five and three years of age, are reported as being fine, healthy children, entirely free from any hydrocephalic symptoms. This case was not reported for the reason that it was either a solitary or an unusual one, but for the purpose of illustration only. Similar treatment has been pursued in other families where there had previously been a hydrocephalic child, and the same good results have uniformly followed. Hydrocephalic children have also been successfully treated by similar means, with the difference that sulphur was not indicated after the disease had made its appearance, and was, therefore, omitted.

Another interesting case of preventive medicine has been

recently reported by J. C. Burnett, M. D., of London, England. In 1874, Dr. B. was consulted by a gentleman about his children, the youngest of whom had double hare-lip. The one next older had a defect in the upper lip, amounting almost to hare-lip, while the third or oldest child had no similar defect. The first born being perfect, the second having an insufficiency of the upper lip, and the third having double hare-lip, it was thought, taking all the circumstances into consideration, that the fourth child would be likely to have double hare-lip and possibly cleft-palate. It was determined to endeavor to prevent so unfortunate an occurrence, and an attempt at ante-natal treatment was made with that view. Calcarea sulph. was chosen in this case in preference to calcarea phos. by reason of the psoric diathesis of the mother. At full term the mother gave birth to a perfect child, and subsequently the same treatment was followed through a second pregnancy with a like result.

The *Practitioner* for December, 1878, contains a paper "On the Preventive Treatment of Cleft-palate, Hare-lip, etc.," by Thomas P. Tuckey, M. D., of County Cork, Ireland. He reports the following case:

Mrs. H., aged thirty-five, mother of six children. Every one of the children has had hare-lip, two having also had cleft-palate. The mother could not call to mind any case of hare-lip in her own or husband's family. Both parents were strong, healthy persons, neither having ever been seriously ill. Dr. Tuckey proposed ante-natal treatment.

A pregnancy occurred when the doctor prescribed the following mixture:

℞. Calcis. phos. - - - - 3 j. grs. 20.
Calcis Carb. - - - - 3 j.
Bicarb. magnes.
Chlorid sodii.
Sodæ Phosph. aa – – ss. M.

The above to be added to an 8 oz. mixture composed of gelatine, gum arabic, syrup of ginger and cinnamon water; 1 dram, three times daily.

As clefts in the palate and lip are said to be due to arrest of development prior to the end of the third month, Mrs. H. was put upon this mixture at once. It was no doubt intended to rep-

resent the constituents of bone. The essential parts are the lime, magnesia and phosphorus.

"The woman took her medicine regularly until the fourth month; at her full time she was delivered of a girl without a trace of deformity about her lips or palate."

Dr. T. reports another case, Mrs. L., "mother of eight children, most of whom had cleft-palate and hair-lip; in four of them the hare-lip was double, and more shocking objects of deformity he had never seen. One boy was perfectly repulsive. The woman believed herself pregnant, and was at once put on the medicine. She went her full time, bore a girl without hare-lip, indeed, but who evidently had had one in utero; for the lip, though united, was united crookedly, and one side was puckered up, as if by a slight and narrow burn."

It may be objected that these cases prove nothing; that there is no positive evidence that the same children would not have been born without deformity if no medicine had been given. To this I answer, I am only citing history, leaving every one free to draw his own inferences. Besides, I am only making suggestions for the purpose of drawing attention to the subject with a view to further investigation, in which I trust the members of this Society will join.

Embryology teaches us that the face is formed of a central portion produced from the frontal process, and of right and left lateral parts derived from the extremity of the first visceral arch. From this arch proceed the parts from which the superior and inferior maxillaries are subsequently developed. At the period in developmental growth when the superior maxillary unites with the frontal process, a cavity remains which constitutes the nasal cavity. The palate and intermaxillary bones bridge this space, and thus the nose is separated from the mouth. There are many varieties of congenital cleft of the palate, differing, however, only in degree, while all of them may be said to result from arrested development. Whenever the inter-maxillary fails to unite with the maxillary bone, a cleft is the result. The same causes which produce the cleft, produce the corresponding hiatus in the soft palate or lip.

In conclusion I wish to say that it does not appear to me to be a legitimate inference that this arrest of development is due to a lack of nutritive material. The maxillaries and all other parts

of the osseous structure complete themselves in the usual way. The arrest of development is limited to a specific and comparatively insignificant anatomical part. If the arrest was due to a lack of material, would it not be likely to include a larger area, and at least affect other parts that calcify coincidently with those now under consideration?

I feel, Mr. President, that an apology is due for the hasty and imperfect manner in which these notes have been prepared. My excuse is that the paper is not intended as a treatise, not even as an essay, but only as a brief presentation of some of my thoughts relative to this obscure, yet very important, subject.

CHARACTERISTICS OF SALIVA IN SYPHILITICS.

BY DR. A. W. HARLAN, OF CHICAGO.

NOT very much will be said concerning the saliva of persons infected with the virus of syphilis, for in most cases there is no appreciable difference existing between such saliva and that from the mouth of a perfectly healthy subject. It is not my purpose to dwell on the characteristics of syphilitic saliva, for the reason that they have no practical bearing in connection with the practice of dentistry except as shall be mentioned further along, but the lesions of the mouth, resulting from inherited and acquired syphilis, are so numerous in form and variety and are so often destructive to the bones of the nose and mouth, that it is incumbent on all dental surgeons to be familiar with their appearance, duration and treatment, primarily for the benefit of the patient, and secondarily for self-protection. Therefore it has been suggested that a brief resumé of the order, character and general appearance of mouth lesions may not prove uninteresting. Saliva from the mouth of a person suffering with syphilis in its second stage presents only this marked physical difference from saliva in general: a sufficient quantity collected for the purpose is poured into a vessel containing water, it sinks more quickly and does not mingle with the water so readily as non-syphilitic saliva; on testing, it is found to contain more albuminous matter, and when there are extensive patches and erosions of the mouth and pharynx it is secreted in abundance, accompanied by increase in

size of the submaxillary glands; during the eruptive period of syphilis it is very much lessened in volume and gives an acid reaction. Saliva is the only one of the physiological secretions which is apt to be the vehicle in spreading the poison of syphilis, examples of which are here presented.

In one case a sailor went from house to house tattooing, and was observed to wet the needles in his mouth before pricking in the colors. Fifteen out of twenty-two persons tattooed acquired syphilis. On examination his mouth and throat were found covered with ulcers and erosions; the pus mingling with the saliva being pricked in with the coloring matter caused the inoculation. Two persons were indiscreet enough to use a tooth-brush which had previously been used by a syphilitic; they both acquired the disease. An old Frenchman smoked a pipe which had been used only a short time previously by a syphilitic friend, and in due course the initial chancre appeared on his lip. By searching the literature of syphilis, numerous cases may be found where kissing has been the means of communicating the disease. Two cases are reported in Woods Library of Medical Science, 1880, volume on venereal diseases, by E. L. Keyes, M. D. In twelve thousand cases reported from hospitals, three and one-third per cent. exhibited the primary sore on the lip or within the mouth; more than ninety-four per cent. of the remainder showed the chancre on the genitals or anus. Whistles and trumpets sold on the streets and wet with the saliva of the vendors, may be infectious. In some regions where glass-blowing establishments are numerous, laws have been enacted to prevent the use of the mouth-tubes except by the owners, on account of the liability of communicating syphilis. Any article used by a syphilitic in the mouth when it is eroded or covered with ulcerous patches may inoculate the innocent user, if it be not thoroughly cleansed. Many an innocent nurse has acquired syphilis by suckling a child inheriting it, as the mouth lesions appear so early in most cases that they are unable to escape unless the nipple remains unabraded. There are some who believe that the twisted end of a new cigar having been wet with saliva of a syphilitic may be contagious. The use of the rubber dam in the mouth of a syphilitic, and its subsequent use in the mouth of another, without perfect cleansing, might prove infectious; it would be if any blood were adherent, as it is known to be infectious. Forceps that have been used and not

thoroughly cleansed, scalers and lancets, particularly abscess lancets, and other instruments used by dentists, oculists, and aurists, unless properly cleansed, would spread syphilis. (See Bumstead and Taylor, E. L. Keyes and Ziemssen, on venereal diseases, for instances of infection by unclean instruments.) In circumcision and vaccination numerous cases are reported, especially in the latter. In transplanting teeth it would be possible to communicate syphilis, but J. Hunter's claim that because an abscess formed opposite the root of the transplanted tooth in three or four weeks after the operation, that it was a chancre, is of course erroneous; the abscess appeared because the pulp was not removed from the tooth, and in three or more weeks it decomposed and the gas had to have exit; hence the abscess. It is impossible to point out the numerous methods of acquiring syphilis in a brief paper. Suffice it to say that we cannot be too careful of our own fingers or our patients' mouths in any suspected case.

An abrasion or a surface capable of absorption, if it have, in contact with it, the poison of syphilis for a sufficient period of time, no matter where the spot be located, is as sure to exhibit the chancre as it is sure to result from sexual contact when one of the persons is diseased. From the fact that persons who acquire syphilis usually resort to the venereal specialist, dentists generally may be ignorant of the cause of the disease in its primary form, except from reading or when medically educated, but when the secondary symptoms progress far enough to exhibit excoriations, erosions, ulcers and mucous patches in the mouth and throat, the dermatologist necessarily sends his patient to a dentist in order that all tartar shall be removed from the teeth, rough corners filed off and pieces of roots removed, ill-fitting dentures trimmed and polished, so that the tongue, cheeks and lips may be free from such sources of irritation. If the person infected falls into the hands of a dentist before consulting a physician, his knowledge of the clinical features of the disease ought to enable him to attend to the hygiene of the mouth so effectually that the treatment of the case constitutionally may be left to the venereal specialist until a cure is effected.

An outline may now be presented of the course of syphilis. After contact with the poison a chancre appears in three or four weeks, or longer; the chancre always appears at the point of

inoculation; in two weeks thereafter the adjacent lymphatic glands enlarge, but seldom suppurate. After a month or six weeks has elapsed, an eruption on the skin, which may be quite general, appears, usually preceded by slight fever, accompanied by headache, rheumatic pains at night, and an enlargement of the epi-trochlear and post cervical glands; co-incident with these symptoms the mouth lesions are met with, consisting of mucous patches, erosions and ulcers; they are concomitant from time to time with other general symptoms of the disease during its whole course. After the expiration of a year, the mouth lesions are much worse, being usually whitened and excoriated patches, ragged ulcers upon the fauces and in the mouth, especially deep ulcers on the inside of the lower lip and opposite the last molar teeth. The tongue white and furred which cannot be scraped off without bleeding, its edges and under surface raw and the adjacent nasal mucous membrane covered with dark yellow and brownish scabs, a thickening and fissuring of the orifice of the nostrils, with the breath quite offensive. The mucous patch when once seen is not likely to be confounded with that from any other affection. It is nearly round and raised slightly, of a dirty white color, sometimes red or granulated, and covered with a puruform secretion; its size varies from a point to that of a large copper cent, patches occur on the tonsils, the whole of the pharynx, within the lips, the nose, trachea, larynx, and upon the tongue or under it. They are generally painless unless surrounded by erythema, irritated by smoking, or a rough tooth, or some similar cause. A person with a mucous patch upon the lip or within it, is far more dangerous to a community than half a dozen people with developed chancres on the genitals, as may readily be seen when it is known that the secretion from it is infectious; lobing of the tongue which is often observed, is generally the result of too vigorous use of mercury and is not the result of syphilis in any stage. Chancre of the lip, which is most often seen in hospitals, is globular or oval, angry looking and the size of a nickel; many of you have seen it; it is highly infectious. Scaly patches appear in the mouth after two or more years, and their favorite locality is at the angle of the mouth, the tip, sides and dorsum of the tongue; frequently masses of overgrowth with adherent epithelium cover a patch under the tongue, which, when detached, are as thick as a knife blade; in some respects

they resemble icthyosis, but a close inspection of this syphilide marks its color a mottled bluish white, and no mistake need be made concerning its origin; these usually require nothing more than local treatment. Gummy tumors of the hard and soft palate come without pain, but when once formed they destroy all tissue which has become infiltrated; they are peculiarly destructive of the bones of the mouth and nose, and need to be heroically treated with the iodides or mercury, internally.

It is generally agreed that syphilis causes the most extensive mouth and throat ravages, especially destructive of bone, when no previous scrofula or lupus can be traced, hence the disfigured nasal organs and injuries of the hard and soft palate, which are frequently irreparable. Gumma of the tongue differs from epithelioma in this: it occurs at any age, has syphilitic history, commences deep and feels like a pea between the fingers, is sometimes mutiple and *may always be found on the posterior aspect and sides, but never underneath the tongue.* When ulceration takes place, it uncovers a deep cavity and is usually painless, which is characteristic. When excised completely, it does not recur. The appearance of mouth lesions from inherited syphilis is often as early as a week from birth to a few months or even years, yet the latter occurs very rarely. Snuffling, and a general coryza, with excoriations around the nose and mouth, indicate very plainly the cause of the trouble; the child whines, its voice is cracked, and the skin drawn tightly over the face, which gives it an oldish look, but the development of patches at the angles of the lips and orifice of the nostrils, are usual and correct points in diagnosis. After the seventh year the notched superior central incisors are a sure indication of inherited syphilis. The whole train of symptoms are observed from inherited that are seen in acquired syphilis, except that there is no chancre; the lymphatic glands do not enlarge, and the nails are affected either by impairment of nutrition or ulcerative onychia, the latter of which is most frequently noticed.

TREATMENT.

The local treatment of mouth lesions from acquired or inherited syphilis, is perfect cleanliness, the use of a soft brush and an alkaline powder or wash; the teeth should be polished and roots be extracted or pivoted; tobacco must be forbidden;

and mild astringent washes and gargles be prescribed for young children. Strong warm tea with X grs. borax to the ℥ i, or V grs. chlorate of potash to the same, are effectual for infants and children. Patches and ulcers may be painted with a solution of nitrate of silver, or solution of corrosive chloride of mercury, grs. iij to ℥ i alcohol, daily; or when necessary they should be touched lightly and carefully with a solution of acid nitrate of mercury twice a week, or any other favorite effectual remedy may be used. If there are gummata likely to involve the bone, idodide of potassium or iodide of sodium should be prescribed in V to X gr. doses or larger, during or after meals. The sodium causes less disturbance of the stomach. If the bones of the mouth have become denuded of their periosteum, no effort should be spared to prevent further caries or necrosis, but no local remedy will be found efficient. If the dentist be timid or wanting in definite knowledge of the needs of the patient, he should be sent to his physician without loss of time. In most cases the dead bone will separate from the living during prompt and appropriate constitutional treatment. Caries must be operated upon beyond the line of decay, then pursue a systemic treatment, which, if kept up sufficiently long, will certainly result in a cure.

It is hoped that if nothing new has been presented in this paper, it will serve to stimulate the unthinking to an investigation of the subject which has been so imperfectly sketched for your consideration.

DISCUSSION.

Dr. Swain: I have made a good many tests with a view to find whether the normal condition of the saliva is acid or alkaline, but without satisfactory results. I found the saliva in some cases acid, and in others alkaline, in persons of equally good health and similar habits, the tests being made from fifteen minutes to half an hour after eating. In more than half the cases it was acid. Twice during the year I have had in my office a harmlessly insane young lady. In her mouth I have found the saliva uniformly acid, but her teeth do not decay. She is about thirty years old, and has only three fillings in her teeth. Stringy saliva is almost always acid, and in such mouths, when the enamel turns white and begins to decay, the free use of precipitated chalk will often check its progress.

DR. BROPHY: Syphilis cannot be inherited from a father unless the mother has it. That is, the mother must acquire it before the child will inherit it, and it is not communicated from one person to another by the *physiological* secretions, but the saliva of syphilitic persons may often be mixed with more or less serum or pus from some abrasion on the lips or mouth.

DR. RICHARDS: During the last few months I have made a great many tests of saliva, in all classes of mouths, both healthy and unhealthy. I found it alkaline in a majority of cases, and especially so in robust and healthy persons. I saw many cases of rapid decay in mouths having alkaline saliva, but between the teeth, where food was lodged and uncleanly, it was acid, and *there* was decay. If we can induce patients, after having had fillings made, to keep the proximal surfaces clean, the operations will usually be preserved. I believe a great deal of decay is caused by the food that lodges in the proximal spaces and remains till decomposed, for want of proper attention to cleanliness.

DR. BLACK: I have made many examinations of saliva with the same general results as described; but we never find decay without there being an acid condition *somewhere* in the mouth, and yet teeth do not *necessarily* decay because the saliva is acid, though they never decay without an acid. Many patients *always* present an acid saliva whose teeth have no decay. There is some other element in this question which we have not yet found out.

DR. SPALDING: The reports indicate that the chemical condition of the saliva does not necessarily produce decay.* If properly developed and well calcified, teeth will resist all these conditions of the saliva, it is the duty of the dental profession to find out the cause of the defective development of human teeth now so prevalent.

DR. BLACK: I wish to say this. Imperfect development is not a cause of decay, but a condition favoring it. Decay is the destruction of the tooth, molecule by molecule, by some substance attacking from without.

DR. SWAIN: I have arrived at the same conclusions as Dr.

* In this discussion the word "saliva" usually means the mixed fluids, saliva, mucus, etc., as found in the mouth.

Black and Dr. Spalding, that the saliva is not very much responsible for decay. Unquestionably, the acids generated from food lodged at the necks of the teeth will produce decay.

Dr. Black: The secretions of the mouth as they often become vitiated while contained there, I do regard as holding a causative relation to decay.

Dr. Spalding: I agree with Dr. Black, except that in two cases of the most rapid decay that I have seen, I could find no acid reaction at any time, in very numerous tests, in all parts of the mouth. If the presence of an acid is essential to decay, how does decay begin in these cases? I have no doubt that after it had made some progress an acid reaction might be obtained within the cavities of decay. We have only just begun to investigate or to understand this subject.

Dr. Brophy: Alkaline secretions will injure the cementum, and alkaline washes should be used with caution, if the cementum at the necks of the teeth is exposed.

Dr. Black exhibited photographs of a girl now thirteen years old, who at five years old lost the cheek and lips of one side by a slough caused by salivation. The lower jaw is firmly anchylosed. The development of the teeth has proceeded with this condition existing; the shedding of the temporary teeth and the growth of the permanent ones has been perfectly regular, except that the teeth stand a little outward from the normal position. The special point of interest in the case is this: The buccal surfaces of all the exposed teeth have suffered from erosion, which is precisely the same in appearance as that which we find in normal mouths. The eroded surface is hard and smooth as glass, and some of the teeth are eroded almost to the pulp cavity. These teeth have never been used in chewing food; they have not been bathed in the saliva, except as it overflows the mouth and runs out upon them, which it does a good deal. They have never been filed or cut in any way. As to this point I have the evidence of the girl herself, of her parents, and the family physician. The teeth of the opposite side have their proper covering of cheek and lips, and show no trace of erosion, and are otherwise perfectly normal. This case strikes me as furnishing a new fact

in regard to abrasion or erosion of the teeth, or at least a case occurring under such novel conditions that I think it well to place it on record.

DISCLAIMER.

The Publication Committee of the Illinois State Dental Society, desire it distinctly understood that neither the Committee nor the Society endorse any advertisement published herein.

Edmund Noyes,
E. D. Swain, } *Pub. Com.*

GIVE US YOUR SUBSCRIPTION NOW

FOR 1882.

Ohio State Journal

—OF—

DENTAL SCIENCE

—A MONTHLY JOURNAL OF—

48 to 56 Pages, for Two Dollars per Year.

EDITOR:

GEO. WATT, M. D., D. D. S.,

XENIA, OHIO.

PUBLISHED BY

RANSOM & RANDOLPH,

DENTAL DEPOT,

TOLEDO, - - - OHIO.

WHAT THREE OF THE LEADING JOURNALS SAY

—OF THE—

OHIO STATE JOURNAL OF DENTAL SCIENCE.

Dental Register of March, 1881.

OHIO STATE JOURNAL OF DENTAL SCIENCE.—Since the issue of the last number of the *Register*, the first number of the above-named journal has made its appearance; and its matter and appearance is certainly equal to, if not beyond, the sanguine expectation of Dr. Watts' warmest friends. Its matter is throughout attractive, interesting and instructive. It is different from any other dental journal that exists or ever did exist, and on this account it fully justifies the statement that there is room for another journal. The publishers, in its paper and execution, have done splendid work, and in appearance it is equal, if not superior, to any other dental journal published.

The *Register* believes in having just as many children in the family (professional) as can be taken care of. We hope that often the *Register* will help to broadcast the good things of the JOURNAL. Long may it live, and greatly may it prosper.

Extract from Johnston's Miscellany of March, 1881.

THE OHIO STATE JOURNAL OF DENTAL SCIENCE is lying before me, and its first number is so well gotten up that old journalists instinctively fall to estimating the amount of labor that the editor will have to expend once in two months to maintain its standard. It contains sixty pages of reading matter besides advertisements, and is beautifully printed on excellent paper. * * * * * The literary matter is of just the kind that I like to see in a dental magazine. It is not dry or tiring. While it is calculated to instruct, there is not that inordinate, encyclopedical heaviness which some editors seem to have a great preference for.

Missouri Dental Journal, March, 1881.

THE OHIO STATE DENTAL JOURNAL.—The first number of this new journal has been received, and we unhesitatingly pronounce it the most beautiful in appearance of all the dental journals published. So much for its outward aspect. Of its contents it is sufficient for those who know Dr. George Watt to say that he is its editor, and has entire control of its reading columns.

Dr. Watt is no novice in editorial work. For many years he and Professor Taft were co-editors of the *Dental Register*, and his labors in that capacity did much towards giving to the *Register* its wide-spread popularity. His ability is universally conceded, and now that he has regained his health, we may look for many good things to flow from his facile pen.

His articles are always readable, and barring the inconsistencies and unphilosophical dogmas of allopathy, to which he holds, he is the peer of any man in dentistry or medicine.

Competition from such a source is always to be welcomed as giving strength and stability to our periodical literature.

1882.

THE

Ohio State Journal of Dental Science

With January 1st we commence to issue this journal as a monthly, instead of a bi-monthly. The liberal subscriptions given us, and the assurances of future patronage and support promised, justify this enlargement. We can assure the readers that the numbers already before them are only a promise of the future. No expense or trouble will be spared to make THE JOURNAL what one of its critics designates it, namely, "The representative Dental Journal of America." We have arranged for a series of illustrated articles from able members of the profession, which will add much to its attractiveness.

Our able editor, Dr. Watt, will continue to control the editorial work of THE JOURNAL; and that is assurance enough to those who know him that, while it will have nothing but what is of value to the profession, there will be no beaten track followed. It will be a live, spicy journal, with something of interest for all. Dr. Watt's health seems to improve with the work, and we may reasonably expect him to be spared to welcome old and new friends as readers of THE JOURNAL for some years to come.

Although January 1st will commence but the second volume of THE JOURNAL, it has a success that places its subscription list above many of the old journals before the profession; but we need the help of all our friends, and will endeavor, by good paper, fine typographical work, etc., to do our part as publishers. The advertising pages will contain notices of all the new articles of merit before the profession. Although the publishers are dental depot men, they buy goods from all the manufacturers and endeavor to give their patrons what they want, not intending to push any one make or man's goods upon them.

The subscription price has been put at $2.00 a year; and, in order that we may maintain the high standard of THE JOURNAL, we must ask prompt payment in advance. Those who remit before December 1st will receive the December number free.

Nominally we give no premiums; but in reality large ones: By low subscription price, better paper, presswork, and general get-up than is found in most of the journals before the profession.

We want THE JOURNAL to win on its own merits. Give us your subscription — you will not regret it.

Yours truly,

RANSOM & RANDOLPH,

DENTAL DEPOT,

TOLEDO, OHIO.

Dr. Gilmer's Essay on Fracture of Inferior Maxilla, illustrated with 41 cuts, will commence in December Number.

KING'S OCCIDENTAL AMALGAM.

PRICE REDUCED TO $3.00 PER OZ.

This Amalgam has been before the profession in Ohio and Western Pennsylvania for some years, and all who have used or tested it, agree that it has merits over any other Amalgam in the market.

The process of manufacture differs from that of other Amalgams, and

BY A NEW INVENTION

Dr. King is enabled to obtain better results, both in regard to COLOR, SHRINKAGE, and EXPANSION, than is obtained in any other alloy in the market.

Test for color consists of sixty grains of Sulphuret of Potassa, dissolved in one ounce of water. Amalgam plugs to be left in this solution twenty-four hours or more. The Occidental will remain bright after this test, and we know of no other Amalgam, at even double the price, but that will discolor. All who would use the best should buy

KING'S OCCIDENTAL AMALGAM.

TESTIMONIALS.

PITTSBURGH, September 22, 1881.

I believe the Occidental Amalgam has *no equal* in the market to-day

GALE FRENCH, D. D. S.

PITTSBURGH, September 22, 1881.

I think the Occidental Amalgam superior to any I have ever used

J. G. TEMPLETON, D. D. S.

Ask your Dental Depot for it, or send to

RANSOM & RANDOLPH, WHOLESALE AGTS.

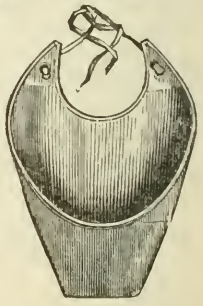
83 Jefferson Street, - TOLEDO, OHIO.

DENTAL APRON OR BIB.

(Patented April 20, 1875, by R. HORTON, D.D.S.)

The above useful article is having a large sale and giving entire satisfaction, supplying

A Want Long Felt by Many Operators.



Made with wire frame. It is held in position better if the tape is tied on top of the head.

MANUFACTURED ONLY BY

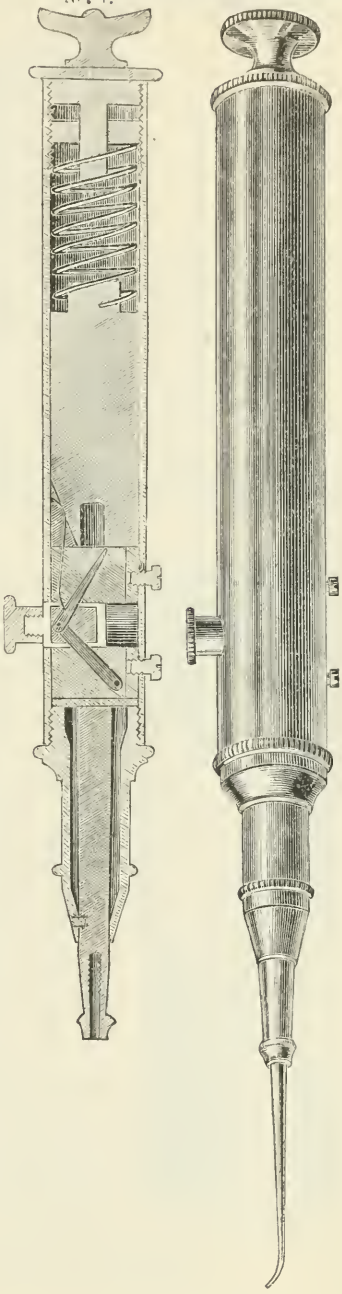
RANSOM & RANDOLPH,

Sent by mail on receipt of the Price, $1.00.

LaSalle's Automatic Pluggers.

Patented April 6th, 1880.

No. 1.



It is with pleasure that we call the attention of the Dental profession to the above instrument, which is conceded by all who have used it, to be superior to any in the market.

The cut represents the full size, and cut No. 1 shows the inside working machinery of the same. The instrument is held between the thumb and forefinger, with either the thumb or finger resting on the button.

As will be seen, by a slight pressure down on the button, acts upon the elbow joint and forces back the hammer until the loose arm of the elbow joint falls into the slot in the hammer, which immediately releases the same and creates the blow. The force of the blow is regulated by the coil spring in the end.

The advantages of this instrument over others of the kind are—

1st. When the Plugger point is placed upon the filling, there is no downward pressure required to produce the blow, and consequently no liability of its slipping.

2d. In filling back teeth there is no friction on the lips of the patient, as is the case with other pluggers.

3d. In breaking down the walls of a cavity, this instrument is far superior to any other, as the chisel point is placed on the part to be chipped off, and the blow, created as it is, causes no pain, and there is no danger of the point slipping and alarming the patient, as is the case where the blow is created by a downward pressure of the instrument.

4th. The ease and facility with which all operations are performed with it.

Call and examine.

Price, Nickel-plated, - $10.00.

Orders entered and filled in rotation, by

RANSOM & RANDOLPH

Dental Depot.

TOLEDO, - OHIO.

Hood & Reynolds' Gold and Platina Alloy

UNSHRINKABLE FILLING.
Gold and Platina Alloy.
(WILL NOT TARNISH)
Prepared by HOOD & REYNOLDS,
Manufacturers of Fine Gold Foil, Refiners and Assayers, and Dealers in Dental Materials.
74 TREMONT ST. BOSTON.

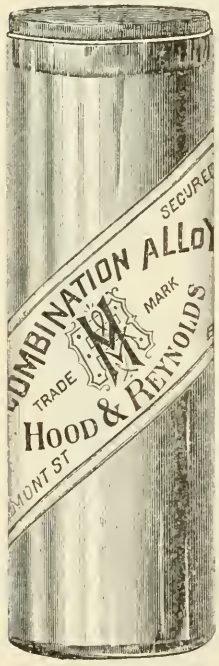
This Amalgam is too well known to require more than passing notice. We have sold thousands of ounces, and have yet to hear the first complaint.

It has been used for years in the Dental School of Harvard University and the Boston Dental College.

ONE OUNCE PACKAGE, - - - - - - -	**$5.00.**
HALF OUNCE PACKAGE, - - - - - - -	**$2.50.**

BOSTON, April 27, 1881.

The Boston Dental College have, for several years, used Hood & Reynolds' Gold and Platina Alloy, and find it highly satisfactory as to hardness, color and susceptibility to a fine finish. In my own practice I use it in preference to all others. ISAAC J. WETHERBEE, *President.*



Hood & Reynolds' Combination Alloy

We wish to call the attention of Dentists to our Combination Alloy.

This is not a new amalgam, but has stood the test of years, and we feel perfectly safe in guaranteeing it to be the best Two-Dollar Amalgam ever offered to the profession.

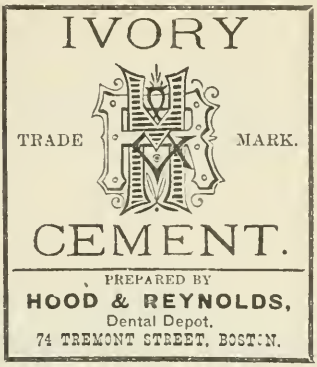
It contains no cadmium or other injurious substance, but is made of perfectly pure metals.

It requires but little mercury, amalgamates very quickly, and is particularly free from dust and dirt.

One Ounce Package, - - -	$2.00
Half Ounce Package, - - -	$1.00

For sale by Ransom & Randolph.

Hood & Reynolds' Ivory Cement



We offer this Cement to the profession with the assurance that it will be found to possess all of the most desirable qualities. It is easily mixed, easily packed, unshrinkable, insoluble, non-conducting, non-irritating and durable.

For capping exposed nerves it is invaluable, as by its use these operations can be performed quickly, easily, and with comfort to the patient.

In filling large cavities it makes an excellent foundation for gold or amalgam, and its use saves much labor and expense.

In setting Richmond's crowns, it will be found very useful for securing the metal pins in position.

Price per Package, - - - - $1.50.

HOOD & REYNOLDS' SPECIALTIES.

Gold Foils, Cylinders and Ropes,
Gold and Platina Alloy,
Combination Alloy,
Ivory Cement,
Gutta Percha Stopping,
Modeling Composition.

A sample of Amalgam, Gutta Percha, Cement or Modeling Composition will be sent on receipt of five cent stamp.

For sale by Ransom & Randolph.

HOOD & REYNOLDS.

DENTAL DEPOT

74 TREMONT ST., BOSTON, MASS.

MANUFACTURERS OF

GOLD FOIL, AND DEALERS IN ALL KINDS OF DENTAL GOODS

The Round Cylinders are mostly used for old style wedge filling.

We sell ten times as many Flattened Cylinders as we do of all the rest.

GOLD CYLINDERS.

STYLE A,

Flattened.

Nos. ½ 1 1½ 2

STYLE A,

Loose, and can be used as Pellets.

Nos. ½ 1 1½ 2 3

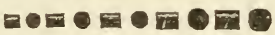
STYLE B,

Loose, but more compact than Style A.

Nos. 1 2 3 4

STYLE C,

Compact, but not Hard ; used as Cylinders only.



Nos. 2 3 4 5 6

These numbers are to denote that No. ½ is a half sheet of No. 4 Gold Foil, cut into strips and rolled into cylinders ; No. 1, one sheet ; No. 1½, one sheet and a half ; No. 2, two sheets, etc.
Two Patents Sept. 19, 1876. Patent Sept. 25, 1876. Patent April 17, 1877.

These cylinders are made from Soft Foil, otherwise called Accommodation Foil, and can be made cohesive by annealing. The advantage over sheet foil is, that they are ready for use, and therefore save the time consumed in preparing foil ; also, loss in scraps. As they are made from Soft Foil, and cut by machinery into strips, and then rolled into cylinders, without any handling with the hands, they are in the most favorable condition for use.
In making these cylinders our best 1000 Gold Foil is used.

PRICE LIST.

GOLD CYLINDERS.

Per ounce, $30. Per 1-2 ounce, $15. Per 1-8 ounce, $4.

CRYSTALLINE SURFACE.

Per ounce, $30. Per 1-2 ounce, $15. Per 1-8 ounce, $4.

COHESIVE, NON-COHESIVE OR SOFT FOIL

Per ounce, $30. Per 1-2 ounce, $15. Per 1-8 ounce, $4

DENTAL GOODS AT MANUFACTURERS' PRICES.

For Sale by RANSOM & RANDOLPH, Toledo, Ohio.

MODELING COMPOSITION,

— FOR —

TAKING IMPRESSIONS OF THE MOUTH, OR ANY OTHER PURPOSE WHERE A PERFECT IMPRESSION IS REQUIRED.

74 Commonwealth Ave.,
BOSTON, May, 1880.

Messrs. HOOD & REYNOLDS:

GENTLEMEN,—I imported the first lot of "modeling compound" that found its way this side of the Atlantic, and have used it ever since, preferring it to plaster for almost every kind of an impression. The objection to it is that tender mouths are apt to be scalded by it. Yours, while in every other way as good as the old, is better in this, that it does not require so great a heat, and can therefore be manipulated more rapidly, and with less discomfort to the patient.

Yours truly,
THOS. H. CHANDLER.

No. 0—Extra Soft.

This grade is for restoring any of the other grades which have become hard by frequent use ; they may be mixed in hot water.

No. 1—Soft.

This grade is for use in cold weather and in tender mouths, and softens at a low heat ; hardens in two minutes.

No. 2—Medium.

This grade is mostly used, and requires a higher heat to soften than No. 1 and sets quicker.

No. 3.

For use in hot weather, and requires a higher heat to soften than No. 2, and hardens quicker.

No. 2 will always be sent, unless other numbers are specified.

Put up in half pound boxes. Price per pound, $1.50.

MANUFACTURED BY

HOOD & REYNOLDS,

DENTAL DEPOT,

74 Tremont Street, - BOSTON, MASS.

For Sale by RANSOM & RANDOLPH, Toledo, O.

MANUFACTURERS OF AND DEALERS IN

DENTAL GOODS

Of Every Description, at Wholesale and Retail.

Sole Manufacturers of

HAYES' IRON CLAD OVEN, HAYES' IRON CLAD BOILER, WHITNEY'S VULCANIZERS, SNOW & LEWIS AUTOMATIC PLUGGERS, SNOW & LEWIS BRACKETS, LATHES, ARTICULATORS, ANNEALING LAMPS, LEWIS AMALGAM PLUGGERS AND BURNISHERS, ETC.

Buffalo Dental Manufacturing Co.,

Court St., cor. Pearl, Buffalo, N. Y.

GEO. B. SNOW, - - - - - - - - - PRESIDENT
THEO. G. LEWIS, - - - - - - - - SECRETARY
JOHN E. ROBIE, - - - - - TREASURER AND MANAGER

Also Sole Manufacturers in the United States of

FLETCHER'S

LABORATORY APPARATUS

(Designed and Patented by Thomas Fletcher, F.C.S., Warrington, Eng.)

Consisting of Hot and Cold Blast Blow Pipes,
Ingot Moulds, Blowing Apparatus,
Gas and Petroleum Furnaces, Ladle Furnaces,
Bunser Burners, Special Heating Apparatus,
Crucibles, Muffles, Etc., Etc.

B. D. M. Co's Goods for Sale by RANSOM & RANDOLPH, Toledo, Ohio.

The Automatic Dental Chair,

—MANUFACTURED BY—

ELIHU BURRITT, Elgin, Ills.

FOR SALE BY

RANSOM & RANDOLPH, Toledo, Ohio.

Illustrated Circulars and Price List sent to any address.

WILKERSON CHAIR.

PRICE, $180.00.

LIBERAL REDUCTIONS FOR ALL CASH PAYMENTS.

For sale by Ransom & Randolph.

MORRISON CHAIRS.

Student's Morrison, Corded Upholstery, $105.

Morrison Chair, Best Plush, - $130.

BOXING FREE.

Address Ransom & Randolph.

Tooth Powder Bottle,

FLINT GLASS—METAL TOP,

(SEE CUT)

Per Dozen, - - - $1.00

PLAIN ROUND,

Per Dozen, - - - $ .75

Address Ransom & Randolph, - Toledo, Ohio.

FLOSS SILK REDUCED IN PRICE.

We have just received a large stock of Superior Floss Silk which we offer at a

REDUCED PRICE.

Per Dozen, - - - - - $1.25

Waxed, per dozen, - - - - - 1.75

LIBERAL DISCOUNT TO THE TRADE.

Address RANSOM & RANDOLPH.

RANSOM & RANDOLPH,

—MANUFACTURERS OF—

Soft and Cohesive Gold Foil

We can now supply a Uniform and Reliable Foil, and we think the best in the market, and could give a large number of testimonials from prominent men in the profession, all of which recommend it in the highest terms. Our Solt Foil is

EXTREMELY TOUGH

and can be brought to any degree of cohesion by being annealed. We aim to furnish the Best Gold in the Market, and at as low a price as possible for a good, reliable foil.

Price, 1-8 ounce $3.75. One ounce $28.00.

POSTAGE FREE.

RANSOM & RANDOLPH,

TOLEDO, OHIO.

EMERSON BINDER.

The Emerson Patn't Binder.
A file & permanent Binding for Music, Periodicals, Photos. Goods, etc.
Showing one cord "beiayed" to cleat, the other withdrawn from eyelet, ready for the reception of papers, etc.

Size for this Magazine, lettered, with name, volume and year....50c

Binder, Cloth Sides, 6x9½.....60c

Order from

RANSOM & RANDOLPH, Toledo, Ohio.

RANSOM & RANDOLPH'S

Fine Dental Rubber. A Dark Rubber like whalebone and bow spring. Sent by mail, post paid, $3.00 per pound.

Welch's Gold and Platina Alloy, $3.00 per ounce; 2 ounces for $5.50; 4 ounces for $10.00.

Welch's Phosphate of Zinc, per box, $1.50.

Welch's Gold Tooth Picks, per dozen, $3.00.

Douglas' Amalgam, new and good, per ounce, $2.00.

Bullion Amalgam, per ounce, $3.00; two ounces, $5.00.

R. & R. Gold and Platina Alloy, per ounce, $4.00.

Blackwood's Gold and Platina Alloy, per ounce $4.00.

Blackwood's Gold and Platina Combination, per ounce, $3.00.

Sterling Amalgam, per ounce, $3.00.

All the Different Kinds at Manufacturers' Prices.

Large Number of Second-Hand Engines. Write for prices.

St. Louis Dental Depot,

A. M. LESLIE & CO.,

PROPRIETORS,

Keep in Stock one of the Fullest Lines of Dental Goods in the Country.

Everything in the line of Dental Supplies on Hand or Supplied to Order. A Superior Article of

RUBBER DAM,

Endorsed by the best members of the Profession in St. Louis, at

$1.75 - - PER YARD.

Address orders,

A. M. LESLIE & CO.,

204 North Fifth St., ST. LOUIS, MO.

GEO. W. ARCHER & CO.,

5, 7 and 9 North Water Street, ROCHESTER, N. Y.,

—Manufacturers of—

Dental Chairs, Cabinets and Spittoons

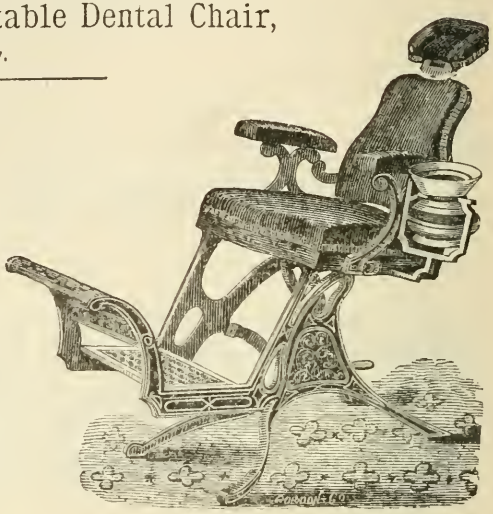
Send to above address for descriptive Price Catalogue, or to

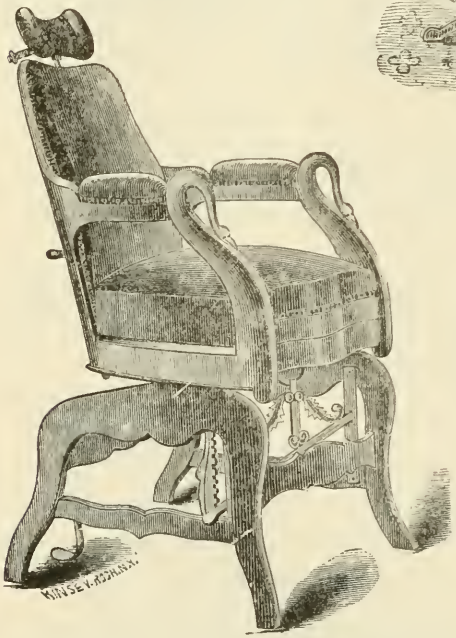
RANSOM & RANDOLPH, TOLEDO, OHIO.

Archer's Iron Adjustable Dental Chair,

No. 7.

No. 7, Iron Adjustable Chair. Chair and Footstool finished in Cane	$30.00
No. 7, Iron Adjustable Chair, in Green, Crimson or Brown Rep	32.00
No. 7, Iron Adjustable Chair, in Green or Crimson Carpet	35.00
No. 7, Iron Adjustable Chair, in Green or Crimson Figured Plush or Leather (see cut)	36.00
No. 7, Iron Adjustable Chair, in Green, Crimson, Maroon or Brown Plain Plush	40.00
Spittoons, extra	7.00





Open Arm,

No. 2.

This Chair is in every respect similar to the regular No. 2 Chair with the exception of the sides or arms being left open. Also, that we put on this Chair our new Ball and Socket Headrest.

Price of Chair in Plain Mohair Plushes, any Color $60.00

FOR SALE AT TOLEDO DENTAL DEPOT.

SAMSON RUBBER

MANUFACTURED BY

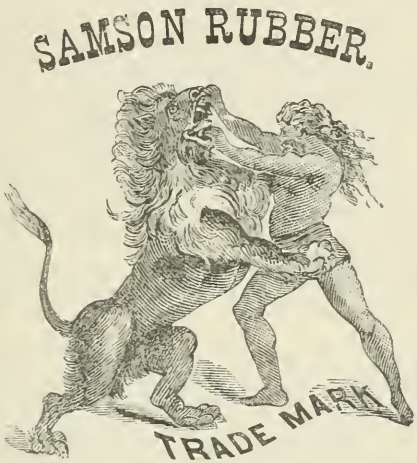
EUGENE DOHERTY,

NO. 444 FIRST STREET, BROOKLYN, E. D., NEW YORK.

WARRANTED TO BE

THE STRONGEST AND MOST UNIFORM RUBBER MANUFACTURED.

It is the TOUGHEST and Most Durable Rubber Made. Vulcanizes same as Ordinary Rubber.



MANUFACTURER OF ALL KINDS OF

Dental Rubbers & Gutta Perchas

PRICE LIST OF DENTAL RUBBERS AND GUTTA PERCHAS.

No. 1 Rubber, per lb.	$2 50
No. 2 Rubber, per lb	2 50
Samson Rubber, per lb	3 00
Black Rubber, per lb	2.50
Flexible or Palate Rubber, per lb.	2 75
Gutta Percha for Base Plates, per lb	2 50
Vulcanite Gutta Percha, per lb	3 50
No. 1 Weighted or Amalgamated Rubber, per lb	$4 00
No. 2 Weighted or Amalgamated Rubber, per lb	4 00
Black Weighted or Amalgamated Rubber, per lb	4 00
Weighted Gutta Percha, per lb	4 00
Adamantine Filling or Stopping,	----

NOTE.—The above Rubbers and Gutta Perchas will be furnished in pound or half-pound packages to any Dentist in the country on receipt of price, and stating that they cannot get them at the Dental Depots in or near their place of business. Circulars giving full instructions how to use all of my Rubbers and Gutta Perchas, will be found in each box or package with the article ordered.

EUGENE DOHERTY,
444 FIRST ST., BROOKLYN, E. D., NEW YORK.

For Sale by RANSOM & RANDOLPH.

TO THE MEMBERS OF THE DENTAL PROFESSION.

A FEW WORDS ON WATTS' CRYSTAL GOLD.

Office, 56 & 58 William Street, New York.

This standard preparation has now been before the Profession for nearly twenty years, and has won its way to general favor solely and entirely upon its own merits, and the demand for it is increasing year by year. I find, however, that some members of the profession suppose that mercury is used in its manufacture, and for that reason have a prejudice against it. This supposition has been strengthened inadvertently by an imperfectly reported account in the "Dental Cosmos," of the paper on Crystal Gold, read before the American Dental Convention by Dr. Ambler Tees, of Philadelphia, at their Annual Meeting, at Long Branch, in August, 1875.

From "Dental Cosmos," August, 1876: "CORRECTION.—In a synopsis of an essay that I read before the American Dental Convention, last August, at Long Branch, on Crystal Gold, published in the November number of the "Dental Cosmos," for 1875, the impression is conveyed to the reader that mercury is used in its preparation. I state distinctly that the article thus made was called *sponge gold*, the result of Dr. Watt's first experiments, but that the Crystal Gold now in the market was the product of *electrolysis*—decomposition by electricity. On invitation of the convention Dr. Watts explained fully his mode of manufacturing it, and stated distinctly that *no mercury* was used. Your reporter failed to give the remarks of Dr. Watt in his report of the proceedings.

"Respectfully yours, AMBLER TEES, D.D.S."

Therefore, for the purpose of removing this impression, I think it my duty to tell how Crystal Gold came into being, and how it is made, but as the limits to which I am confined will not allow of my doing so *in extenso*, I shall take great pleasure in answering any communication from members of the profession who may wish for further information.

My first preparations of gold were made by using mercury or quicksilver to dissolve it—after being purified and finely divided—and in which menstruum it was crystallized by the aid of heat, the mercury being removed afterwards by nitric acid.

My next preparations were made by the use of oxalic acid, saccharine matters, etc., etc., acting by heat upon properly prepared solutions of gold. Several other preparations of gold were also made by other means. All these different and largely differing preparations were called "Prepared Gold." and were sold under that name. *Finally*, many years since, not being satisfied with any of these, I studied the action of electricity upon the salts of gold, and came to my last and best preparation. It was here, in the wonderful and complete phenomena of electrolysis, among the multitudinous forms of gold which appear and are produced under its mysterious influence that I found, in one formation, the long-sought for desideratum, those beautiful and feathery leaves, so soft and light and ductile, to which has been given the name of "CRYSTAL GOLD." Instead of dissolving the gold in mercury, I dissolve it in acids, and placing the proper amount of the same in a suitably prepared vessel, and suspending therein plates of pure gold, I decompose the solution by the aid of specially arranged electric currents. As fast as the solution loses its gold by the deposition of the crystals, it is resupplied by the suspended plates, in accordance with the well-known laws governing electrolysis, and thus is produced, atom by atom, and in a strikingly similar manner to the growth of the foliage of a forest, a large mass of Crystal Gold, of the same texture and character throughout, and entirely free from any deleterious metallic substances—the gold and solutions being all perfectly pure—and which, by subsequent treatment, is wholly freed from the acid solution in which it was made.

It will thus be seen that in the manufacture of the present Crystal Gold *no mercury is used*, and hence there cannot be in the use of it any of the ill effects which might result from that metal or its alloys.

☞ The gold is sold at $32 per ounce, but when parties order by the ounce or half ounce, I make a discount of $3 per ounce, in accordance with the usual custom of other manufacturers. Please address,

N.B.—To be had at all the Dental Depots. **A. J. WATTS, N. Y., Box 1296 P.O.**

For Sale by RANSOM & RANDOLPH, Toledo, Ohio.

GIDEON SIBLEY,

DENTAL DEPOT

S. E. Cor. 13th and Filbert Streets, Philadelphia, Pa.

TRADE MARK.

MANUFACTURER OF

ARTIFICIAL TEETH

AND DEALER IN

DENTAL GOODS OF ALL KINDS.

A Full Line of which we have constantly on hand.

Members of the Profession, not having used our manufacture of Teeth, will study their own interest by sending for a sample set.

They will be found to be equal, if not superior, in strength and bony texture, to any other manufacture, regardless of price. Our **Pins are Larger** than most makes and we have a large and varied assortment of shades and shapes, thus being able to suit almost any case. Do not fail to give them a trial!

PRICES, (Gum or Plain.)

In Sets of 14, - - - - - $1.00 Per Set.

Postage free to all parts of the United States.

Partial Sets, - - - - 8 Cents Per Tooth.

3 cents postage additional on each order of less than 14 Teeth

---

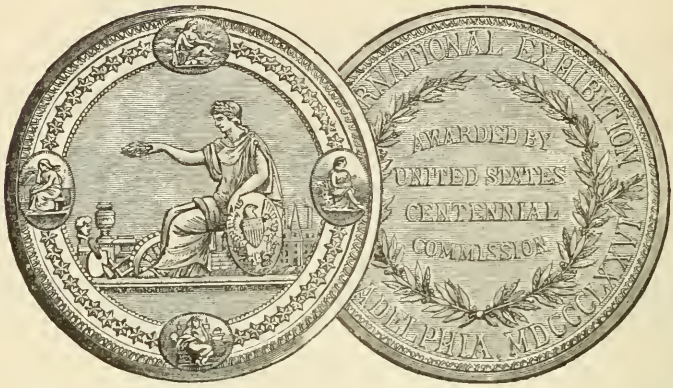
A liberal discount for quantities. Our Teeth are for sale by most dealers.

N. B.—All our Gum Sections bear our Trade Mark as above.

For sale by RANSOM & RANDOLPH, Toledo, Ohio.

MEDAL AND DIPLOMA AWARDED

AT PHILADELPHIA, 1876.



WM. VALLEAU, JR.,

MANUFACTURER OF CHEMICALLY PURE

SOFT AND COHESIVE

GOLD FOILS,

WHOLESALE AND RETAIL,

No. 506 Broome Street, - - NEW YORK.

Established 1849.

VALLEAU'S Gold in stock, and for Sale by RANSOM & RANDOLPH, Toledo, O.

A. R. LUKENS. J. WHITTINGTON.

LUKENS & WHITTINGTON,

(LATE BLAKE & CO.,)

MANUFACTURERS OF

Dental Instruments.

An experience of twenty-five years enables us to supply a line of Instruments that has given general satisfaction, and an increasing business is, we feel, an evidence that our efforts to supply First-Class

ARTICLES AT REASONABLE RATES

have been appreciated. It will still be our aim to keep up with the times by supplying the

LATEST IMPROVEMENTS

as they appear. Experience has shown the wisdom of dividing the two branches of our business (Forceps and Small Instruments), each member of our firm confining his personal attention to a department, thus insuring the care and attention that is necessary to furnish First-Class Instruments. All kinds of repairing will receive the same attention as new work.

212 Chester Street, bet. 8th and 9th, Race and Vine,

PHILADELPHIA, PA.

For Sale by RANSOM & RANDOLPH, Toledo, O.

PHENOL DENTIFRICE

Is confidently recommended to possess most valuable properties. There cannot be found a preparation which so fully meets all the requisites of a tooth powder. The value of the article contained therein -*the one from which it derives its name*—is well known and conceded, and being the first to introduce it into a dentifrice, we have aimed to blend it in the most agreeable and scientific manner.

From the numerous encomiums we are constantly receiving from the leading dental practitioners from all parts of the country, we risk little in claiming it to be by far ***the Best Preparation for the Mouth, Teeth and Gums*** that is at present on the American market.

S. L. GEER, . DENTIST,

Norwich, Conn.

COPYRIGHTED, 1870. **REGISTERED, 1880.**

Sold by RANSOM & RANDOLPH, and all Dealers in Dental Materials.

Rubber Dam.

We have arranged with the manufacturer to receive, every two weeks, a fresh lot of the **Black Rubber Dam**, which is very far superior to that usually sold in the market. Try it, and you will use no other.

PRICE:

Thin, per yard,	$1.00
Medium, per yard,	1.50
Heavy, per yard,	1.75
Extra Heavy, per yard,	2.00

Sent by mail on receipt of price. **RANSOM & RANDOLPH.**

IMPROVED SOFT GOLD FOIL.

Price, $4.00 per 1-8th. $30.00 per Ounce.

It has a peculiar softness not obtainable to so great a degree in any other. Do not fail to try it.

Address

RANSOM & RANDOLPH,

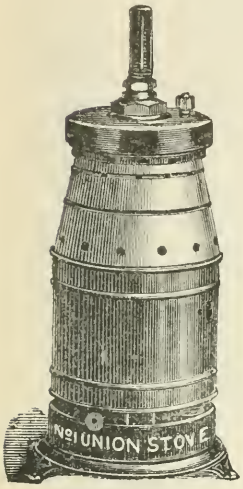
TOLEDO, OHIO.

BUFFALO
Dental Manufacturing Cmpany

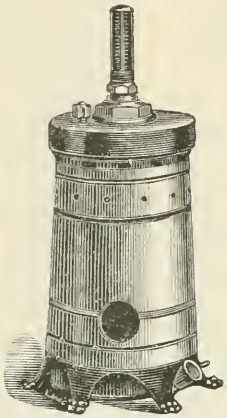
Court St., Corner of Pearl, BUFFALO, N. Y.,

SOLE MANUFACTURERS OF

HAYES' IRON CLAD OVEN, HAYES' IRON CLAD BOILER, WHITNEY'S VULCANIZERS, SNOW & LEWIS AUTOMATIC PLUGGERS, SNOW & LEWIS BRACKETS, LATHES, ARTICULATORS, ANNEALING LAMPS, LEWIS AMALGAM PLUGGERS AND BURNISHERS, &c.

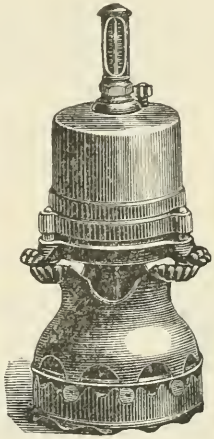


For Kerosene.

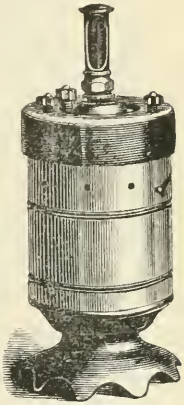


For Alcohol and Gas.

WHITNEY VULCANIZERS.



Iron Clad Oven.



Iron Clad Boiler

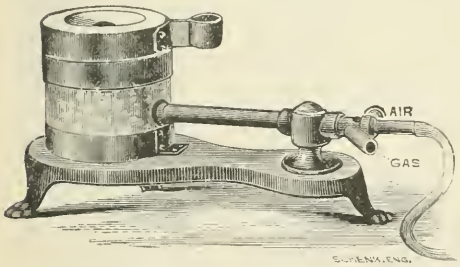
HAYES VULCANIZERS.

ALSO SOLE MANUFACTURERS IN THE UNITED STATES OF

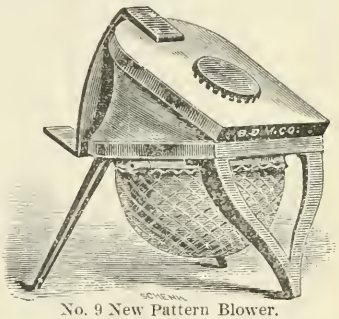
FLETCHER'S LABORATORY APPARATUS

Designed and Patented by THOMAS FLETCHER, F. C. S., Warrington, Eng.

CONSISTING OF HOT AND COLD BLAST BLOW-PIPES, INGOT MOULDS, BLOWING APPARATUS, GAS AND PETROLEUM FURNACES, LADLE FURNACES, BUNSER BURNERS, SPECIAL HEATING APPARATUS, CRUCIBLES, MUFFLES, &c., &c.



No 40A Furnace.



No. 9 New Pattern Blower.

Complete Illustrated Catalogue of Fletcher's Laboratory Apparatus Sent on Application. All goods manufactured by Buffalo Dental Manufacturing Co., for sale by **RANSOM & RANDOLPH, Toledo, Ohio.**

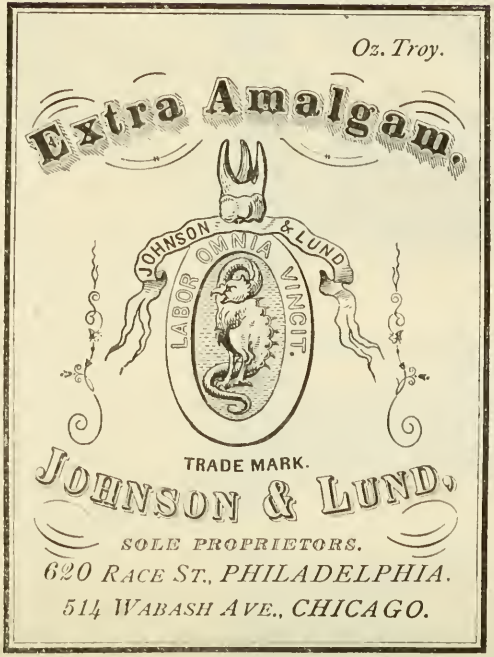
It Works with Great Plasticity and Packs Densely.

IT RETAINS ITS BRIGHTNESS.

From the various encomiums expressed to us both verbally and in writing, we are satisfied that our aim has been reached, viz.: the production of an *AMALGAM*, which, next to gold, makes the best possible filling now known.

In its manufacture the greatest care is taken that none but chemically pure metals are used. Gold, Silver, Platina and Tin enter into its composition, and it is perfectly free from any ingredients that would njure the enamel or dentine.

The great proof of the value of the article is that those who order once order again and again.



Each lot is thoroughly tested before sale, and is sold with a guarantee that it possesss all the qualities we claim for it.

We have sold thousands of ounces during the last few years throughout this country and Europe, and have yet to hear of the first dissatisfaction or complaint.

PRICE.

One Ounce Package, . . .	$4.00
Half " " . . .	2.00
Quarter Ounce Package, .	1.00

When money acccompanies the order, the Amalgam will be sent postage free.

IMPERVIOUS TO THE SECRETIONS OF THE MOUTH.

It Possesses the Greatest Possible Freedom from Shrinkage.

The Extra Tough Rubber is susceptible of a very high polish. A sample will be sent free on application, as it is our desire to give *ocular proof of its qualities.*

One Pound

Extra Tough Rubber.

JOHNSON & LUND,

SOLE PROPRIETORS.

620 Race St. PHILAD'A. — *514 Wabash Av.* CHICAGO.

Registered in the Patent Office at Washington, Nov. 21st, 1874.

It vulcanizes in 55 minutes at 320° Fahrenheit.

PRICE PER POUND, $3.00.

The Extra Tough Rubber is offered to the profession with the assurance that its good qualities place it ahead of all other Rubber bases. It is made of the best Para Gum, which is carefully purified. Owing to the great preponderance of Gum in its composition it is very light in proportion to bulk. Its marked characteristics are *strength* and *elasticity*, and, even at the additional cost, is cheaper to use than the other Red Rubbers, as a much thinner plate is required.

TOLEDO

DENTAL DEPOT.

RANSOM & RANDOLPH,

— HAVE THE —

LARGEST STOCK

— OF ALL KINDS OF —

H. D. JUSTI'S TEETH

TO BE FOUND IN THE WEST.

If you would use the best buy Justi's and no other

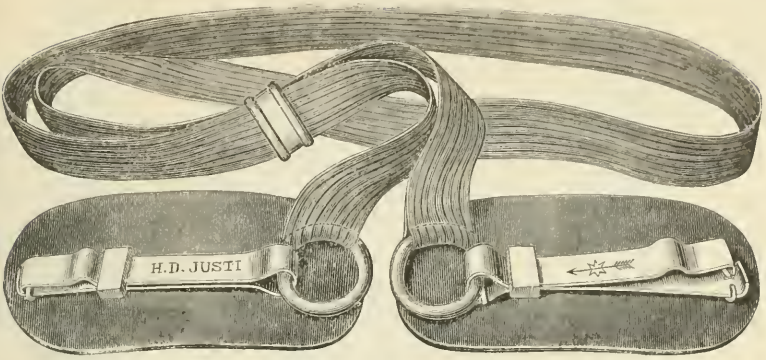
ADDRESS

RANSOM & RANDOLPH

83 Jefferson Street,

TOLEDO, - - OHIO.

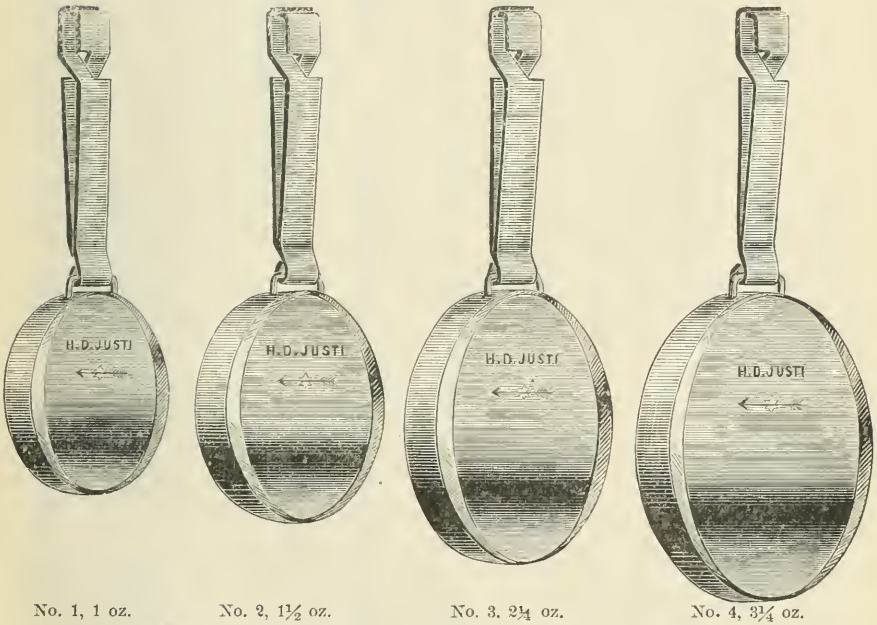
Cogswell's Improved Rubber Dam Holder.



PRICES:

Plain, with Slide (shown in Cut), or Ring, each,				-	-	-	$ 60
With Horn Guards	"	"	"	-	-	-	1 00
With Amber Guards	"	"	"	-	-	-	1 25
With Ivory Guards	"	"	"	-	-	-	1 50
Putting best new Silk Braid on Holder			"	-	-	-	25

IMPROVED RUBBER DAM WEIGHTS.



No. 1, 1 oz. No. 2, 1½ oz. No. 3. 2¼ oz. No. 4, 3¼ oz.

These Weights are attached to the loose ends of the Dam, so as to keep it out of the operator's way, and from annoying the patient.

They are Solid Metal and Nickel Plated. The springs are more readily attached or detached than any other. Price, as shown in cut, each, 50 cents.

For Sale by RANSOM & RANDOLPH, Toledo, O.

SIX WORLD'S-FAIR MEDALS

—FOR—

Artificial Teeth of the Highest Grade.

PARIS, PHILADELPHIA, CHILI, VIENNA;

"SYDNEY" **AUSTRALIA** "MELBOURNE"

FOR

Strength, Adaptability and Life-like Appearance.

THE

SUPERIOR GUM SECTIONS AND PLAIN TEETH

ARE **UNEQUALLED** AND THE

NEW CELLULOID TEETH lately added, far exceed any heretofore offered.

EXTRACT FROM THE GENERAL REPORT OF THE JUDGES OF GROUP XXIV., CENTENNIAL INTERNATIONAL EXHIBITION, 1876.

"H. D. Justi exhibited nothing but teeth, but his display was beautiful in the extreme. In color, translucency and texture, they were all that could be desired; they were a faithful reproduction of the physiological characteristics of the natural organs, both to the individual teeth and relatively to the entire set. Their conformation with reference to close and easy adaptation to the maxillary arch showed careful study of the needs of both patient and operator. Their various and numerous deviations from uniformity of arch and outline, simulating the irregularities of nature, was so perfect that when in the mouth no suspicion of their artificial nature would be entertained. The disposition of tooth-material was so skillfully managed as to secure the greatest amount of strength with the least bulk; and the insertion of platinum pins was so arranged as to render their displacement an almost impossible accident."

H. D. JUSTI,

BRANCH:

No. 60 East Madison St., Chicago, Ills.

Principal Depot: No. 516 Arch St., Philadelphia.

This book must be returned to
the Dental Library by the last
date stamped below. It may
be renewed if there is no
reservation for it.

270-7-60

Illinois State Dental Society
Transactions. 1881.
HRA
DATE
NAME OF BORROWER

Harry R. Abbott
Memorial Library

FACULTY OF DENTISTRY
TORONTO